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# USSR Report

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USSR REPORT  
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EFFECTS OF EXPERIMENTAL HYPOKINESIA IN RATS ON METABOLISM OF SKELETAL MUSCLE PROTEINS

Moscow BIOKHIMIYA in Russian Vol 50, No 8, Aug 85 (manuscript received 7 Dec 84) pp 1305-1311

KAZARYAN, V.A., SHITOV, G.D. and RAPOPORT, E.A., Second Moscow Medical Institute imeni N.I. Pirogov

[Abstract] Outbred male rats were subjected to an 8-week period of hypokinesia to study the effects of motor inactivity on protein metabolism in skeletal muscle. Using radiolabeled leucine, true atrophy was demonstrated to result from a sharp inhibition of synthesis of the sarcoplasmic proteins during the initial two weeks of hypokinesia, as well as a diminished rate in the biosynthesis and acceleration of catabolism of actomyosin. In the first week, muscle weight of the test (m. extensor digitorum longus) decreased by ca. 10%. However, the weight of the muscle relative to that of the body weight remained essentially constant throughout the experiment and basically equivalent, on a ratio basis, to that of the control rats. In the third-to-eighth weeks, weight gain of the muscle under study was largely precluded by accelerated catabolism of newly-synthesized components of the contractile proteins. The initial inhibition of sarcoplasmic proteins was attributed to stress-related hormonal effects, i.e., increased release of glucocorticoids. References 20: 15 Russian, 5 Western.  
[280-12172]

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UDC 632.4:633.11:582.285.2

AREAS POPULATED BY WHEAT LEAF RUST PATHOGENS

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 19, No 2, Mar-Apr 85  
(manuscript received 16 May 84) pp 158-163

MIKHAYLOVA, L.A. and VASILYEV, S.V., All-Union Institute of Plant Protection,  
Leningrad

[Abstract] One of the principal tasks of the studies of populations of phytopathogenic microorganisms is to define the areas populated by them and the exchanges taking place through migrations. These areas could cover entire continents. The populations of *P. recondita* were studied during the 1981-1983 period using a series of monogenic lines from the Thatcher brand. Comparison of clones selected from populations in the Caucasus with other Soviet territories showed no similarities; strong similarities were observed among clones isolated from various Caucasian regions. It could be concluded that at most two populations of *P. recondita* exist in the Soviet Union (illustrated by a schematic geographic chart): One population covered European USSR and Siberia, and the other--regions of Dagestan, Georgia, Checheno-Ingushetia, Northern Osetiya, and Southwestern Krasnodar region; these two areas are separated by a natural barrier--the Caucasus Mountains. Figures 1; references 8: 7 Russian, 1 Western  
[1027-7813]

UDC 582.001.4:582.287.237:582.288.45

'POLYPORUS SQUAMOSUS HUDS. EX FR. PS-G4' STRAIN, TO BE USED AS A PRODUCER OF FOOD BIOMASS, IDENTIFIED AS FUSARIUM SAMBUCINUM FCKL. VAR. OSSICOLUM (BERK. ET CURT) BILAI

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 18, No 6, Nov-Dec 84  
(manuscript received 11 Jan 82) pp 439-444

BUKHALO, A.S. and ELLANSKAYA, I.A., Institute of Botany imeni N.G. Kholodnyy, UkSSR Academy of Sciences, Kiev

[Abstract] Results of culture-morphological studies of the strain "P. squamosus PS-G4" are reported. This strain was identified as a representative

of the genus *Fusarium* Lk. ex Fr. Electron microscopic examination showed absence of apertures in intercellular walls of hypha, characteristic of higher basidiomycetes. On the basis of culture-morphological indices, the "P. squamosus PS-G4" strain was assigned to *Fusarium sambucinum* var. *ossiculum* Bilal. There are literature data indicating toxic properties of *F. sambucinum*; therefore, before deciding on its use as a source for food or fodder, careful analysis of all available data should be performed. Figures 3; references 14: 13 Russian, 1 Western.  
[1028-7813]

UDC 581.19:582.288.123:637.2

#### PRODUCTION OF TOXINS BY *ASPERGILLUS* SPP OBTAINED FROM BUTTER

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 18, No 6, Nov-Dec 84  
(manuscript received 18 Jan 84) pp 470-474

GRIGORYAN, K.M., ELLER, K.I., MAKSIMENKO, L.V., OSIPYAN, L.L. and  
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Academy of Medical Sciences, Moscow

[Abstract] The goal of this study was to determine the toxicity and ability to produce sterigmatocystine and aflatoxin by *A. versicolor*, *A. nidulans*, and *A. flavus* fungi isolated from butter and grown on synthetic media. Analysis of experimental data showed that there is a direct relationship between the toxicity of the strains studied and their ability to produce sterigmatocystine. Analysis of the air in butter storage places showed presence of the spores of *A. versicolor* and *A. nidulans* fungi; hence, it was quite feasible that butter could be infected from air. The experiments showed that some of these strains could produce sterigmatocystine on butter after artificial infection. A certain risk factor was identified in production of butter. References 11: 3 Russian, 8 Western.  
[1028-7813]

UDC 582.288.22:581.4

#### BIOLOGY OF *ASCOCHYTA* LEAF BLIGHT AGENT OF LUCERNE IN BELORUSSIA

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 29, No 11, Nov 85  
(manuscript received 25 Mar 85) pp 1039-1041

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PEKELNAYA, T.S., Institute of Experimental Botany imeni V.F. Kuprevich,  
Belorussian SSR Academy of Sciences

[Abstract] A survey was conducted on the biological characteristics of *Ascochyta imperfecta* isolated from lucerne in 16 sites in Belorussia in

1979-1981. The bicellular spores show their greatest development in early spring, with the spores developing preferentially on lucerne leaves. Best growth conditions for *A. imperfecta* are provided by potato-glucose medium. The spores range in size from 11.2-16.8 x 3.4-5.6  $\mu\text{m}$  for the bicellular forms, to 5.6-11.2 x 2.8-3.4  $\mu\text{m}$  for the unicellular spores. Optimal growth occurred at 20-25°C and a relative humidity of 95%. However, satisfactory growth was obtained over the wide temperature range of 5 to 35°C and a relative humidity of 43 to 100%. Figures 2; references 13: 8 Russian, 5 Western.  
[286-12172]

/13046

## BIOCHEMISTRY

### DISCOVERY REGARDING ELECTROCATALYTIC ACTION OF ENZYMES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Dec 85 p 1

[Excerpt] Yesterday the USSR State Committee on Inventions and Discoveries recorded discovery No 31'. It belongs to the branch of physical-chemical biology which studies mechanisms of enzymatic catalysis and methods of controlling them. The new discovery was made at the Moscow State University and the USSR Academy of Science's Institute of Electrochemistry imeni Frumkin. Its authors are I.V. Berezin, corresponding member of the USSR Academy of Sciences; doctors of chemical sciences S.D. Varfolomeyev and M.R. Tarasevich; and candidates of chemical sciences V.A. Bogdanovskaya and A.I. Yaropolov.

The essence of this new discovery of Soviet scientists lies in the fact that the possibility of accelerating electrode reactions with the aid of biological catalysts--enzymes--has been theoretically substantiated and demonstrated experimentally.

Experiments demonstrated that enzymes attached to surfaces of electron conductors or incorporated into the matrix of a conductor can perform the role of catalysts of electrochemical reactions.

Expensive metallic catalysts based on platinum have been used for electrocatalysis. Even the best of them are not active enough to permit the electroreduction of molecular oxygen, on which the speed of many technically important electrochemical processes depends, however. Scientists have now found conditions in which an enzyme is capable of exchanging electrons with a conductor and accomplishing desired bioelectrochemical reactions. A unique capability of the enzymes is retained in the process--increasing the speed of these reactions by millions of times. The phenomenon that has been discovered has been named bioelectrocatalysis.

How did they manage to combine things that appear to be incompatible? Studying the mechanism of enzymatic catalysis and properties of enzymes, the researchers found a way of combining two different reactions which consists in direct transfer of electrons between the active center of an enzyme and an electrode.



This discovery is of great practical importance. Principles of future intensive processes are being worked out in laboratories. Scientists are convinced, for example, that bioelectrocatalysis can lead to profitable production of many needed compounds, including physiologically active ones.

Analytical devices have been designed which make it possible to determine the composition of substances in complex biological systems. This is important for biomedical diagnosis, for example. Also of interest are sensors for monitoring the synthesis of substances in microbiological reactors.

FTD/SNAP  
/13046  
CSO: 1840/297

ELECTROMECHANICAL POWER APPLICATION SEEN FOR BIOELECTROCATALYSIS

Moscow VECHERNYAYA MOSKVA in Russian 19 Dec 85 p 1

[Excerpt] The USSR State Committee on Inventions and Discoveries recorded a major scientific discovery today.

Its authors are corresponding members of the USSR Academy of Sciences I. Berezin, doctors of chemical sciences S. Varfolomeyev and M. Tarasevich, and candidates of chemical sciences V. Bogdanovskaya and A. Yaropolov.

They established for the first time that enzymes of living organisms are capable of substantially accelerating electrochemical reactions on the surface of metals and of other conductors.

This work has great scientific and practical significance. Specifically, bioelectrocatalysis will make it possible to speed the development of such promising directions of science and industry as biotechnology and electro-mechanical power engineering. Broad possibilities are presented for the development of new, highly efficient energy converters, and for obtaining a wide range of physiologically active compounds which cannot be synthesized by any other method.

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CSO: 1840/297

## WORK ON OBTAINING MEDICAL PREPARATIONS FROM MARINE LIFE

Moscow NTR: PROBLEMY I RESHENIYA in Russian No 14, 3-16 Dec 85 p 4

[Article by Rasskazov, V., candidate of biological sciences, deputy director of the Pacific Institute of Bioorganic Chemistry]

[Excerpt] The Pacific Institute of Bioorganic Chemistry (TIBOKH) of the USSR Academy of Sciences' Far East Research Center is one of the institutions in whose laboratories studies are being made of compounds obtained from marine animals and plants.

TIBOKH research is in progress in seas of the Far East and in tropical regions of the world's oceans.

Means of studying various substances obtained from the seas are being improved year by year. Biochemical, physical and mathematical methods are being used in this research.

Many years of research have yielded valuable information on a number of compounds, many of which have proved highly promising for medicine, agriculture and other branches of the economy. Preparations isolated from sea cucumbers, for example, have proved to be potent antifungal agents on a par with the widely known nystatin. In clinics, they can be used in hemosorption and in the removal of cholesterol from the blood. Certain bioglycans, on which work has been done for a number of years in TIBOKH laboratories, have a strong stimulating effect. Tests performed at the USSR Academy of Medical Sciences' All-Union Oncology Research Center and at the Institute of Microbiology and Epidemiology of the academy's Siberian branch have demonstrated that these compounds also can be added to the list of drugs from the sea.

TIBOKH's work on the study of enzymes that decompose biopolymers is of great interest. An original method for isolating laminarinase enzymes from a bivalve mollusk has been proposed in one of the institute's laboratories. These enzymes can be employed for the purpose of utilizing waste products of the fishing industry and obtaining industrial glucose.

The institute has organized a small technological section at one of the local fish processing plants. A line for producing a valuable preparation with a powerful antifungal effect from trepang extract (which was formerly considered

a waste product) has been installed and is in operation at this plant. A line for producing a number of enzymes for waste products of the fishing industry will also operate at the same plant. These enzymes will find use in genetic engineering and medicine. Measures are also being taken to expand an experimental production facility, which will make it possible not only to isolate physiologically-active substances but also to obtain a number of them by methods of organic synthesis.

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CSO: 1840/297

UDC 591.150:575.24+577.155.2

COMPLEX OF DNA-POLYMERASE ALPHA WITH 3'→5' EXONUCLEASE FROM REGENERATING RAT LIVER

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 3, Nov 85  
(manuscript received 6 Jun 85) pp 724-726

KRAVETSKAYA, T.P., KLEYNER, N.Ye., TIMCHENKO, L.T. and KRUTYAKOV, V.M.,  
Leningrad Institute of Nuclear Physics, imeni B.P. Konstantinov, USSR  
Academy of Sciences, Gatchina, Leningrad Oblast

[Abstract] For the first time, a complex of DNA-polymerase alpha with 3'→5' exonuclease and a number of other proteins are obtained from regenerating rat liver. The complex, with molecular mass  $10^6$ , is localized in the nuclear membrane. The DNA-polymerase alpha was isolated from the rat liver by a method described earlier, adding a stage of gel filtration on a column with sephadex G-200. In the presence of sodium dodecylsulfate, the hydrophobic and electrostatic bonds between the components of the complex weaken and it decomposes. A number of other proteins in the complex appear and activity of the low molecular mass and intermediate forms of DNA-polymerase is detected. Figures 1; references 11: 5 Russian, 6 Western.  
[208-6508]

UDC 577.152

SERINE TRYPSIN-LIKE PROTEINASE FROM CELLS OF PLAGUE PATHOGEN YERSINIA PESTIS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 3, Nov 85  
(manuscript received 10 Jun 85) pp 727-730

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Active Member, USSR Academy of Sciences, Institute of Biological and Medical  
Chemistry, USSR Academy of Medical Sciences, Moscow; Scientific Research  
Antiplague Institute, Rostov-na-Donu

[Abstract] A study is reported of the activity of serine proteinases in a cellular extract of *Y. pestis* EV-76, with the intention of isolating and determining the physical-chemical and enzymatic properties of the proteinases if found. Such an enzyme was found, and this article presents a report on



its partial purification and a study of certain of its properties. A study of the effect of serine proteinase inhibitors on the activity of the enzyme from the plague pathogen cells revealed that its activity was completely inhibited by phenyl-methyl-sulfonyl-fluoride and contrical, an animal origin serine proteinase inhibitor. The activity of the proteinase was not depressed by reagents with sulfhydryl groups. The presence of 2-mercaptoethanol greatly reduced, mercaptopropionyl glycine completely inhibited the activity of the enzyme. The proteinase has an isoelectric point in a weakly alkaline medium at pH 7.2. The pH optimum of activity in a synthetic substrate is pH 8. The physiological role of the enzyme is unknown, and will be studied in the future. Figures 1; references 11: 6 Russian, 5 Western.  
[208-6508]

UDC 577.152.344

#### MODULATION OF THROMBOCYTE AGGREGATION BY MODIFIED FORMS OF THROMBIN

Moscow BIOKHIMIYA in Russian Vol 50, No 9, Sep 85 (manuscript received 11 Dec 84) pp 1433-1439

LUKYANENKO, Ye.F., STRUKOVA, S.M., KIREYEVA, Ye.G., BALAKINA, T.A. and GORBUNOVA, N.A., Institute of Physiologically Active Substances, USSR Academy of Sciences, Chernogolovka, Moscow Oblast; Chair of Animal and Human Physiology, Moscow State University imeni M.V. Lomonosov; Central Scientific Research Institute of Hematology and Blood Transfusion, Moscow

[Abstract] A comparative analysis was conducted on the efficiency of human thrombin in aggregating thrombocytes, as well as of modified forms of thrombin, and of the effectiveness of low concentrations of thrombin and its modified congeners in priming thrombocytes for aggregation by thrombin. Alpha-thrombin was effective in causing aggregation in a concentration of 1-5 nm. Beta/gamma-thrombin, diisopropylfluorophosphate-treated alpha-thrombin (DIPFP-alpha-thrombin), and trypsin required a concentration of 100-250 nm for platelet aggregation with a much greater latency. Short-term (2 min) priming of the thrombocytes with alpha-thrombin, DIPDP-alpha-thrombin, trypsin or beta/gamma thrombin potentiated the responsiveness of the thrombocytes to alpha-thrombin, whereas longer priming (15 min) with trypsin, beta/gamma-thrombin, or alpha-thrombin diminished the susceptibility of the platelets to alpha-thrombin. However, 15 min preincubation with DIPFP-alpha-thrombin increased susceptibility to alpha-thrombin. The findings were interpreted to indicate that induction of thrombocyte aggregation by alpha-thrombin requires that the latter possess both a functional active site and a binding site. The specificity of alpha-thrombin as a stimulant to aggregation appears to require special sites other than the active site with high affinity for complementary sites on the thrombocyte membrane. Figures 4; references 18: 3 Russian, 15 Western.  
[281-12172]

GLYCINE-B<sup>30</sup>-INSULIN: NOVEL STRUCTURAL ANALOG OF HUMAN INSULIN

Moscow BIOKHIMIYA in Russian Vol 50, No 9, Sep 85 (manuscript received 27 Mar 85) pp 1560-1561

SHVACHKIN, Yu.P., NIKITINA, A.M., FUNTOVA, S.M., KRASNOSHCHEKOVA, S.P., FEDOTOV, V.P. and IVANOVA, A.I., Institute of Experimental Endocrinology and Hormone Chemistry, USSR Academy of Medical Sciences, Moscow

[Abstract] A combination of chemical and enzymatic techniques were utilized to synthesize glycine-B<sup>30</sup>-insulin, an analog of human insulin that would be suitable for per os administration by withstanding digestive enzymes. In mouse convulsion tests, glycine-B<sup>30</sup>-insulin was 100% equivalent to human insulin with thr on the B<sup>30</sup> position. This study represents an initial approach to the preparation of insulin analogs by the modification of porcine insulin that would resist hydrolysis by carboxypeptidases, and yet retain full biological activity. References 7: 2 Russian, 5 Western.

[281-12172]

UDC 577.19

## CHROMATOGRAPHIC BEHAVIOR OF HUMAN LEUKOCYTIC INTERFERON (INF-ALPHA) ON SEPHAROSE AND SILOCHROME ADSORBENTS

Moscow BIOKHIMIYA in Russian Vol 50, No 9, Sep 85 (manuscript received 20 Dec 84) pp 1471-1480

BORUKHOV, S.I., IZOTOVA, L.S., KOSTROV, S.V., STEROVEROV, S.M., MUSATOVA, A.A. and STRONGIN, A.Ya., All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow

[Abstract] Studies were conducted on the chromatographic behavior of INF-alpha isolated from a genetically engineered bacterial producer by chromatography on immobilized monoclonal antibodies. Trials with this homogenous INF-alpha preparation on column adsorbents containing immobilized dyes, aromatic dipeptides, metal-chelate complexes, hydrophobic ligands, and porous glass led to the definition of optimal adsorbents and chromatography conditions. INF-alpha was most efficiently chromatographed on porous glass, L-trp-L-trp-Sepharose-4B, and Cu<sup>2+</sup>-chelate adsorbents. In the latter case, equally efficient separation and isolation is obtained by the substitution of the less expensive silochrome for Sepharose CL6B. The chromatographic data indicate that INF-alpha possesses a hydrophobic pocket with exposed aromatic amino acid moieties that bind selectively with aromatic dipeptides. Figures 6; references 22 (Western).

[281-12172]

PUTATIVE PARTICIPATION OF BRAIN-SPECIFIC S100 PROTEINS IN REGULATION OF  
PHOSPHORYLATION/DEPHOSPHORYLATION OF ENDOGENOUS NEUTRAL SUBSTRATES

Moscow BIOKHIMIYA in Russian Vol 50, No 12, Dec 85 (manuscript received  
13 Mar 85) pp 1987-1989

GRUDEN, M.A. and POLETAYEV, A.B., Institute of Normal Physiology imeni  
P.K. Anokhin, USSR Academy of Medical Sciences, Moscow

[Abstract] Brain and liver homogenates of outbred rats were employed to test the regulatory role of brain-specific S100 protein and its endogenous anionic and cationic protein ligands (AL and CL), derived from bovine brain, in phosphorylation and dephosphorylation reactions. Studies with protein fraction ranging in size from < 25 to 450 kdaltons from murine brains and livers demonstrated that S100 and AL and CL preferentially affected the metabolism of murine brain proteins, thereby demonstrating a certain degree of organ specificity. S100, for example, markedly enhanced phosphorylation of brain proteins with a MW in the 300-450 kdalton range after 30 min of incubation, while inhibiting the phosphorylation of 110-160 kdalton proteins during 5 min of incubation. AL, on the other hand, inhibited phosphorylation of 250-450 kdalton proteins during 5 min incubation period, but in that same time frame stimulated phosphorylation of < 25-50 kdalton proteins, whereas S100 and CL did not do so. These observations indicate that S100 and its ligands play a regulatory role in protein phosphorylation reactions in neural tissues, and that this may reflect protein kinase and dephosphorylase activities. References 10: 7 Russian, 3 Western.  
[284-12172]

COMPARATIVE ANALYSIS OF PROTEOGLYCANS ISOLATED FROM INTACT AND REGENERATING  
RAT LIVERS

Moscow BIOKHIMIYA in Russian Vol 50, No 8, Aug 85 (manuscript received  
11 Jun 84) pp 1249-1254

RYKOVA, V.I., ZIMINA, N.P. and NIKOLAYEVA, Ye.S., Institute of Cytology and  
Genetics, Siberian Department, USSR Academy of Sciences, Novosibirsk

[Abstract] An analysis was conducted on the composition of proteoglycans isolated from intact and posthepatectomy livers of Wistar rats to determine whether the proteoglycans are involved in cellular proliferation and whether changes in proteoglycan composition can be correlated with RNA and DNA synthesis. Intact and regenerating livers were found on cellulose acetate electrophoresis to contain 5 proteoglycan fractions: proteoheparan sulfates I, II, and III, and proteochondroitin sulfates B and AC. Maximal levels of fraction I were detected 3-6 and 15 h after partial hepatectomy,

time periods characterized by minimal levels of fraction II. Maximal concentration of fraction II was observed 12 h after partial hepatectomy, a period of minimal concentration of fraction I. The maxima of reciprocal changes in fractions I and II coincided with activation of DNA transcription in the liver, which precedes DNA replication. They also were coincidental with a wave of synchronized mitotic activity of the hepatocytes. These observations suggest a role for proteoglycan sulfates I and II in cellular proliferation in the liver. Figures 2; references 27: 6 Russian, 21 Western. [280-12172]

UDC 577.151.042

INHIBITION OF INSECTICIDE-DETOXIFYING ENZYMES OF INSECTS BY ALKYLATING ANALOG OF CYTOCHROME P-450 SUBSTRATE

Moscow BIOKHIMIYA in Russian Vol 50, No 8, Aug 85 (manuscript received 17 Oct 84) pp 1284-1289

NEDELKINA, S.V., LEONOVA, I.N., SALGANIK, R.I., ZENKOVA, T.Yu., VAYNER, L.M. and POPOVA, V.I., Novosibirsk Division of the All-Union Scientific Research Institute of Chemical Agents for Plant Protection; Institutes of Cytology and Genetics and of Chemical Kinetics and Combustion, Siberian Department, USSR Academy of Sciences, Novosibirsk

[Abstract] The common housefly, *Musca domestica*, was employed in a study designed to test the effects of topical application (0.1-0.5 mg/g) of alkylating and nonalkylating analogs of substrates of cytochrome P-450. Evaluation of microsomal and postmicrosomal fractions demonstrated that application of the alkylating analog, 4-bromomethyl-2,2,5,5-tetramethyl-3-imidazoline-3-oxide-1-oxyl, was effective in reduction of the activities of cytochrome P-450, monooxygenases, esterases, and of glutathione-S-transferase by ca. 20%. In vitro studies showed an inhibition on the order of 80%. The nonalkylating analog, 4H-methyl-2,2,5,5-tetramethyl-3-imidazoline-3-oxide-1-oxyl, was essentially without inhibitory activity on the enzymes involved in insecticide detoxification. The inhibitory action of the alkylating analog was attributed to covalent binding to the enzymes and may represent an effective class of agents in promoting insecticidal activity by inactivating several enzymes at once. Figures 3; references 16: 2 Russian, 14 Western. [280-12172]



## CONFORMATION CHARACTERISTICS AND STABILITY OF POLYMER-CONJUGATED STREPTOKINASE

Moscow BIOKHIMIYA in Russian Vol 50, No 8, Aug 85 (manuscript received 7 Dec 84) pp 1312-1318

TARATINAT, T.M., ILLARIONOVA, N.G. and MOSKVICHEV, B.V., All-Union Scientific Research Institute of Antibiotics and Enzymes with Medical Applications, Leningrad

[Abstract] Circular dichroism spectroscopy was conducted in the 200-300 nm region on native streptokinase and streptokinase modified by conjugation with a hydrophilic copolymer prepared from N-vinylpyrrolidone and acrolein acetal. Derivatization of streptokinase was found not to affect its secondary structure and induce only minimal changes in the tertiary structure of the protein. Improved structural stability of the modified streptokinase was evidenced by its greater resistance to denaturation by urea vis-a-vis the native enzyme, as well as by much greater tolerance of heat (83°C for 1 h) than that exhibited by the native protein. Figures 4; references 21: 14 Russian, 7 Western.  
[280-12172]

UDC 547.964.4.057.577.175.829'17.017

## SYNTHESIS AND STUDY OF CYCLIC AND LINEAR ANALOGS OF NEUROTENSIN

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 12, Dec 85 (manuscript received 3 Jun 85) pp 1589-1597

GRINSHTEYNE, I.V., MYSHLYAKOVA, N.V., VEGNER, R.E., VOSEKALNA, I.A., GAYLITE, E.A., GRIGORYEVA, V.D. and CHIPENS, G.I., Institute of Organic Synthesis, LaSSR Academy of Sciences, Riga

[Abstract] Neurotensin (NT) molecule contains a series of potential quasi-cyclization centers which can participate in fixation of spatial structure of biologically active conformers. Continuing an investigation of cyclic NT, new analogs were synthesized: [cyclo(13 → 8), Gly<sup>8</sup>]NT(8-13), [cyclo(13 → 7), Gly<sup>7</sup>]-NT-(7-13), [cyclo(13 → 5), Lys<sup>5</sup>]-NT-(5-13), [cyclo(13 → 4), Lys<sup>4</sup>]-NT-(4-13) and their linear precursors. A solid-phase method was used to synthesize protected linear precursors which then were cyclized with diphenylphosphoryl azide, after selective removal of Vos-group from the N-terminal aminoacid radical. In vivo and in vitro biological tests showed that the greatest depressor activity was exhibited by the cycloheptapeptide. CD spectra of these compounds were analyzed. It was shown that in aqueous solutions the cyclohexapeptide analog is in a rather rigid conformation, different from the conformation of the corresponding linear compound and the NT-(9-13) fragment. NT, its cyclohepta- and cyclonona-peptide analogs have a random structure. Figures 4; References 17: 5 Russian, 12 Western.  
[268-7813]



LIGHT-INDUCED YIELD OF CALCIUM IONS FROM RETINAL CONES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 3, Nov 85  
(manuscript received 29 May 85) pp 735-739

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[Abstract] A calcium-selective extracellular microelectrode was used to find that the cones, like rods, liberate  $\text{Ca}^{2+}$  into the intracellular medium when stimulated by light. This result directly contradicts the hypothesis of Hagins in its original form. Experiments were performed on isolated retinas from the frog *Rana ridibunda* and the tortoise *Emys orbicularis*. The animals were dark adapted overnight, retinas extracted from the eyes in dark red light. The retinas were placed receptor side upward on strips of filter paper in a moist chamber. Placement of the microelectrodes was monitored by a means of an infrared microscope. Calcium concentration was measured using two-channel extracellular microelectrodes with tip diameter 2-5  $\mu\text{m}$ . The time constant of the calcium-selective electrodes was not over 0.1 s. The light-induced output of  $\text{Ca}^{2+}$  from the rods described earlier was easily recorded in the frog retina. Exposure to constant blue (450 nm) illumination at  $1.6 \cdot 10^4$  quanta per rod per second results in great calcium output. Sufficiently bright stimulus excites the cone receptor potential, also accompanied by an increase in extracellular calcium concentration, the cone origin of these responses being proven by their spectral sensitivity. Figures 3; references 9: 5 Russian, 4 Western.  
[208-6508]

ELECTROCHEMICAL CONTROL OF ACTIVITY OF IMMOBILIZED ALKALINE PHOSPHATASE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 3, Nov 85  
(manuscript received 5 May 85) pp 710-712

KULIS, Yu.Yu., YASAYTIS, Yu.Yu. and RAZUMAS, V.Y., Institute of Biochemistry, LSSR Academy of Sciences, Vilnius

[Abstract] A study is reported of the effect of alkaline phosphatase immobilized on an electrode and changes in its activity by an electrochemically

created pH gradient. Electrophoretically-homogeneous alkaline phosphatase from *E. coli* was used in the work. The results indicate that the enzymatic activity at the interface can be controlled by changing the rate of the conjugate process of reduction of oxygen. The conjugate processes occur in biological membranes. The phenomenon discovered provides new possibilities for the creation of chemotronic devices based on biological catalysts. Figures 3; references 5: 3 Russian, 2 Western.

[208-6508]

/13046

## BIOTECHNOLOGY

### DEVELOPMENT OF EcoRV, ENZYME FOR GENETIC ENGINEERING

Moscow MEDITSINSKAYA GAZETA in Russian 1 Jan 86 p 1

[Article by Chernyshov, A. (Moscow)]

[Excerpt] The appearance of genetic engineering in molecular biology's arsenal of methods is the result of the interplay of many biological disciplines. But the discovery of certain enzymes might be considered the main event which allowed direct manipulation of genes to begin. These enzymes are capable of cutting DNA into fragments at strictly determined places which are specific for each enzyme. These enzymes are called restriction endonucleases, or restrictases.

The first restrictase of this class was described 15 years ago. Since then, the list of enzymes has grown rapidly.

Work in this direction is being done in our country. One such project was completed not long ago by associates of the USSR Academy of Medical Sciences' Institute of Epidemiology and Microbiology imeni Gamaleya. Here the first Soviet restrictase was obtained, and it has found broad use in genetic engineering in our country and abroad. The search for it lasted more than four years. The researchers worked painstakingly; under the direction of Professor A.F. Moroz, associates of the institute's burn infections laboratory conducted experiments with numerous strains until fortune finally smiled upon them. Senior science associate L.I. Glatman and physician M.B. Yablokova discovered a restrictase with unique properties in a strain of the colon bacillus. This gene was localized in a plasmid. But a new difficulty arose at this point: not one but six plasmids in all were discovered in the restrictase-possessing strain. Resourcefulness and patience were required in order to find precisely the plasmid that synthesized this enzyme, which was given the name EcoRV. The restrictase was studied and described also by researchers of the All-Union Scientific Research Institute of Genetics and Selective Breeding of Industrial Microorganisms, together with associates of the laboratory.

The first stage of the project was completed. But the amount of enzyme obtained in laboratory conditions was comparatively small. Its yield had to be increased sharply, so that its industrial production could begin as quickly as possible. This stage of the work was done under the direction of

Academician A.A. Bayev at the USSR Academy of Sciences' Institute of the Biochemistry and Physiology of Microorganisms. Many researchers took an active part in this work, including A.N. Kravets, a young scientist. As a result, qualitatively new strains that are superproducers of the restrictase were obtained; they allow its production to be increased by more than 100 times. This has made it possible to begin its industrial production in our country. A number of foreign firms also have introduced the enzyme into production. This work is protected by four certificates of invention, and two licenses have been sold.

The restrictase EcoRV remains an object of active study by Soviet and foreign researchers. Experiments have demonstrated that it is a very convenient model for study of a key problem of contemporary molecular biology--mechanisms of protein-nuclein interactions.

FTD/SNAP

/13046

CSO: 1840/298

#### DESIGNATED PRIME MISSION OF BIOTECHNOLOGY

Yerevan KOMMUNIST in Russian 21 Dec 85 p 3

AFRIKYAN, E., Director of Institute of Microbiology, ArSSR Academy of Sciences, academician, ArSSR Academy of Sciences

[Abstract] In the new program of CPSU and the Principal Directives for Economy and Social Development, considerable attention is devoted to development of the agroindustrial complex which is especially important in the Armenian SSR. One of the more exciting developments in this area is the use of the so-called immobilized enzymes and cells. Processes based on this technology should be expanded in many industries. Biotechnology could assist the workers in the fields of material reprocessing and utilization of secondary starting materials. Several modifications are proposed in specific areas relating to: development of fuel and energy resources using industrial wastes; increase in the quality of combination feed by enrichment with proteins and vitamins; introduction of technical processes aimed at wasteless productivity; development and reinforcement of the scientific-technological basis at academic institutions and organizations of scientific-productivity centers for microbiological synthesis of feed proteins, enrichment of agricultural products, utilization of animal husbandry wastes, and production of new chemicals.

[276-7813]

UDC 581.1

#### SOMACLONAL VARIATION IN CELL CULTURE OF DIOSCOREA DELTOIDEA WALL

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 3, Nov 85  
(manuscript received 26 Jun 85) pp 766-768

KARANOVA, S.L., GORSKAYA, N.V. and BUTENKO, R.G., corresponding member, USSR Academy of Sciences, Institute of Plant Physiology imeni K.A. Timiryazev, USSR Academy of Sciences, Moscow

[Abstract] A dioscorea deltoidea cell culture is a promising source for steroid sapogenins. The source strain used for some time is IFRD-1 dioscorea.

Recently, in addition to diosgenin, this strain has synthesized its 25-S-epimer yamogenin. The question is whether this is related to heterogeneity of the initial population or some other cause. The cloning method was used in an attempt to determine this. Some of the clones obtained were studied for intensity of growth and accumulation of steroids when cultured in liquid nutrient medium. Seventeen clones were studied in all. The cells of all studied clones synthesized both sapogenins. Four clones synthesized more diosgenin, 13--more yamogenin. Significant variability of growth intensity, accumulation of steroid saponins and quantitative relationship of sterins was observed. A plant cell culture is a unique genetic system, a cell population, the cells of which vary in number of chromosomes and may be at various stages in the cellular cycle. Cells with different levels of ploidy may originate cell lines and clones with different physiological and biochemical characteristics. Since the cells of all clones synthesize both sapogenins, it is assumed that selection of hereditary changes has occurred in the population of cells of strain IFRD-1, resulting in the fact that the cells have gained the capability to accumulate the 25-S-epimer. References 13: 7 Russian, 6 Western.  
[208-6508]

UDC 615.373:57.083.33 .012+57.083.33

#### ENZYMOIMMUNOLOGIC TEST FOR DETECTION OF MONOCLONAL ANTIBODIES FORMED BY HYBRIDOMAS

Moscow IMMUNOLOGIYA in Russian No 5, Sep-Oct 85 (manuscript received 16 Apr 85) pp 83-85

DRABER, P., GORZHEYSHI, V., ANGELISOVA, P., BARTEK, Yu. and VIKLICKY, V.,  
Institute of Molecular Genetics, Czechoslovakian Academy of Sciences, Prague

[Abstract] The authors note that the most difficult part of the process of preparation of hybridomas is discovery of specific antibodies. They have utilized an enzymeimmunologic test in the preparation of B hybridomas forming antibodies to swine transferrin, tubulin and human transferrin. A description of the method is presented. The test can be used both for detection of monoclonal antibodies in supernatant fluids or ascitic fluids of mice during growing of hybridoma cells in vitro and also for determination of antibody titers in the sera of immunized mice. The advantage of the micromodification of the enzymeimmunologic test described for discovery of monoclonal antibodies is the possibility of using previously prepared reagents in the form of sets permitting long-term storage, accelerating the detection of specific antibodies. Visual qualitative evaluation of test results is sufficient for rapid determination of producing hybridomas. Figures 1; references 8 (Western).

[231-6508]

/13046



UDC 616-006.04-036.22-07

CANCER MORBIDITY REVEALED BY MASS SCREENING

Leningrad VOPROSY ONKOLOGII in Russian Vol 31, No 4, Apr 85 (manuscript received 9 Jul 84) pp 16-21

DENISOV, L.Ye., VOLODIN, V.D., GRETSOVA, V.I. and ZAYEVA, N.N., Moscow

[Abstract] Mass screening [dispensarization] over the 1977-1982 period showed an increase in cancer morbidity from 7.770/1000 to 9.826/1000, representing an annual rate of increase of 10.5%. In 1982, skin cancers were encountered most frequently (19.2% of the case load), followed by breast cancer (13.2%), colon cancer (11.7%), stomach cancer (10.5%), urinary organ cancer (10.1%), lung cancer (9.1%), malignancies of the female genitalia (7%), and hemopoietic malignancies (6.4%), with the remaining neoplasms accounting for 12.8% of the case incidence. In that time frame, the number of patients with stage IV disease remained constant. It has been estimated that 58.6% of all the cases of malignancy are uncovered during the mass screening program. The annual mortality due to malignant tumors has been calculated at 19.6%, with a 45% 5-year survival figure and a 21.12% 10-year survival statistics. References 2 (Russian). [214-12172]

UDC 616.441-006.6-036.22-07

EPIDEMIOLOGY AND EARLY DIAGNOSIS OF THYROID CANCER IN STARA ZAGORA (BULGARIA)

Leningrad VOPROSY ONKOLOGII in Russian Vol 31, No 5, May 85 (manuscript received 27 Nov 84) pp 59-62

VLAKHOV, N., MIRCHEV, Vl. and DIMITROVA, R., Okrug Oncological Dispensary, Stara Zagora, Bulgaria

[Abstract] Material available at the Okrug Oncological Prophylactic Dispensary in Stara Zagora, Bulgaria, was the basis for an epidemiologic assessment of thyroid cancer morbidity in the region. The region has a population of 645,000; the incidence of thyroid cancer in the survey period 1964-1983 was 1.62/100,000, equivalent to 0.83% of the total oncologic cases recorded. In each 5-year period, patients with stage II disease represented

the dominant group, accounting for 55% of the cases. Over the years, there has been a tendency for the thyroid tumor incidence to increase, largely as a result of an increase in the incidence among women, with the female: male ratio now standing at 2.7:1. Urban dwellers tend to predominate over rural residents (1.5:1), with most of the cases falling into the 31-50 years age bracket. Among the most useful diagnostic measures for early diagnosis were palpation and radioisotope scanning. References 9: 8 Russian, 1 Western. [215-12172]

/13046

ASSOCIATION OF ALLELIC VARIANTS OF BLOCKS OF GLIADIN COMPONENTS WITH  
PRODUCTIVITY OF WINTER WHEAT GENOTYPES

Moscow DOKLADY VSESOYUZHNOY ORDENA LENINA I ORDENA TRUDOVOGO KRASNOGO ZNAMENI  
AKADEMII SELSKOKHOZYAYSTVENNYKH NAUK IMENI V.I. LENINA in Russian No 9, Sep 85  
(manuscript received 31 Jan 85) pp 5-7

SOZINOV, I.A. and POPERELYA, F.A., All-Union Order of Lenin and of the Red  
Banner of Labor Institute of Breeding and Genetics

[Abstract] A study was conducted on the interrelationship between allelic variants of block of gliadin components, controlled by gene clusters located on the short arm of chromosomes 1A and 1B, with the harvest of winter wheat. The studies conducted in the period 1976-1982 concerned blocks most commonly encountered among winter wheat variants in Southern Ukraine. Evaluation of homozygotic lines  $F_6 \dots F_9$  resulting from the crossing of Bezostaya-1 winter wheat (gliadin formula 4.1.1.1.1) and Dneprovskaya-521 (1.2.1.1.1.1) demonstrated that considerably higher harvests were obtained with lines containing the Gld 1A1 block, in comparison with lines containing the allelic block Gld 1A4. The average yearly gain was on the order of 2.8 centners/ha. Similarly, lines with Gld 1B1 showed greater productivity than lines with the block Gld 1B2. However, in one year with heavy precipitation, productivity of Gld 1B2 exceeded that of Gld 1B1. The gliadin component composition, therefore, appears to be devoid of a direct effect on productivity of winter wheat; rather, the allelic variants of the blocks seem to serve as genetic markers of genes associated in determining productivity. References 10: 7 Russian, 3 Western.  
[288-12172]

PRODUCTION OF COMBINANT OF SMALLPOX VACCINE VIRUS INDUCING SURFACE ANTIGEN OF HEPATITIS B VIRUS BASED ON STRAIN LIVP

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 3, Nov 85  
(manuscript received 11 Jun 85) pp 696-699

ALTSHEYN, A.D., ZAKHAROVA, L.G., LOPAREV, V.N., PASHVYKINA, G.V., GORODETSKIY, S.I., CERNOS, V.I., SENKEVICH, T.G., ANTONOVA, T.P. and ANDZHAPARIDZE, O.G., Active Member, USSR Academy of Medical Sciences, Institute of General Genetics imeni N.I. Vavilov, USSR Academy of Sciences, Moscow; Moscow Scientific Research Institute of Viral Preparations

[Abstract] The principle of inclusion of foreign expressible genes in the genome of the smallpox vaccination virus has been applied to yield viruses of the strain LIVP, including the expressible S- gene of the hepatitis B virus, which codes the surface antigen HBsAg. This work describes the first LIVP-strain recombinant expressing the HBsAg. A figure presents a diagram of the pJB-BH3 plasmid used to obtain the recombinant virus. In this plasmid the S gene was placed under the control of a promoter and inserted into the cloned thymidine kinase gene of the smallpox vaccination virus. This recombinant is the first of a series of recombinants produced by the authors containing the S gene of the hepatitis B virus based on the LIVP strain. Studies are continuing on the creation of an optimal recombinant suitable for development of an effective live hepatitis B vaccine. Figures 3; references 7: 3 Russian, 4 Western.

[208-6508]

UDC 575.24:576.85

EXPRESSION OF ALPHA-AMYLASE GENE OF BACILLUS AMYLOLIQUEFACIENS IN THE YEAST SACCHAROMYCES CEREVISIAE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 3, Nov 85  
(manuscript received 29 May 85) pp 717-720

GOROZHANKINA, T.F., BEBUROV, M.Yu., SOROKIN, A.V. and STEPANOV, A.I., All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow

[Abstract] A study is presented of expression in *S. cerevisiae* of the genes of gram-positive bacteria using the  $\alpha$ -amylase gene of *B. amyloliquefaciens* as a model. It has been found that in the leader portion of the  $\alpha$ -amylase gene between the promoter and mRNA bonding site with the ribosomes, an IS1 element is inserted which does not disrupt expression of the gene in *E. coli*. The results obtained indicate that the  $\alpha$ -amylase gene is expressed in yeast cells, stably preserved in the combination of the recombinant plasmid. The yeasts accumulate up to 5 micrograms of active enzyme per liter of medium.

This is some 250 times less than the level of synthesis of the enzyme in *B. coli* and 100,000 times less than the level of its synthesis in *B. subtilis*. Figures 2; references 11: 1 Russian, 10 Western.  
[208-6508]

/13046

## IMMUNOLOGY

### WORK ON POLIOMYELITIS VACCINES, HEMORRHAGIC FEVER IMMUNIZATION

Moscow MEDITSINSKAYA GAZETA in Russian 3 Jan 86 p 1

[Article by Yurin, F.]

[Excerpt] The personnel of the Institute of Poliomyelitis and Virus Encephalitis of the USSR Academy of Medical Sciences (AMN SSR) have approached the 12th 5-Year Plan with a good list of accomplishments to their credit.

"From the first days of the new year, we are continuing research on one of the main topics on which our personnel have been working for a number of years," related S.G. Drozdov, member of AMN SSR and director of the institute. "It is the perfecting of live poliomyelitis vaccines with prescribed properties. The vaccine which is now being used in practice--a vaccine of the third type--is genetically less stable than the other two types. We are trying to develop a new, recombinant strain of this preparation which would combine the best properties of the earlier ones, namely, antigenic stability and heightened genetic stability. Such a vaccine has already been obtained, and a group of associates headed by Professor V.I. Agol is now testing its reliability.

"Laboratory methods for identifying an antigen of the virus which causes hemorrhagic fever with renal syndrome have been developed, and methods for isolating and cultivating the causative virus have been mastered at the institute in recent years," Sergey Grigoryevich continued. "This has made it possible to ascertain more precisely areas in which this disease is spreading, including areas in which this type of fever has not been recorded previously.

"We are now introducing these new methods in laboratories of the country's medical institutions."

FTD/SNAP

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CSO: 1840 298



## EFFECTS OF GANGLIOSIDES ON CYTOTOXIC ACTIVITY OF NATURAL KILLER CELLS OF SYRIAN HAMSTER

Moscow BIOKHIMIYA in Russian Vol 50, No 9, Sep 85 (manuscript received 15 Jan 85) pp 1514-1516

DYATLOVITSKAYA, E.V., KLYUCHAREVA, T.Ye., MATVEYEVA, V.A., SINITSYNA, Ye.V. (deceased), AKHMED-ZADE, A.Sh., LEMENOVSKAYA, A.F., FOMINA-AGEYEVA, Ye.V. and BERGELSON, L.D., Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow; Oncological Scientific Center, USSR Academy of Medical Sciences, Moscow

[Abstract] In vitro studies were conducted on the effectiveness of NK cells of Syrian hamsters in killing MOLT-4 human lymphoma cells and the modification of their cytotoxicity by various gangliosides. A dose-dependent inhibition of cytotoxicity was displayed by the gangliosides SiaLacCer and Sia<sub>2</sub>LacCer; the concentrations were equivalent to those encountered in the blood of tumor-bearing animals. Less efficient inhibition of NK activity was exhibited by (NeuAc)<sub>2</sub>GgOse<sub>3</sub>Cer NeuGcOse<sub>3</sub>Cer and NeuAcGgOse<sub>3</sub>Cer were virtually devoid of inhibitory activity of the NK cells. Since previous studies had demonstrated that Sia<sub>2</sub>LacCer is either absent or present in extremely low concentrations in tumor-free animals, but that the ganglioside is produced and secreted ("shed") by a number of tumors, it appears that the active gangliosides may be involved in the escape of tumor cells from immune surveillance.

References 12: 4 Russian, 8 Western.

[281-12172]

## COMPARATIVE IMMUNOCHEMICAL ANALYSIS OF HUMAN LEUKOCYTIC INTERFERONS

Moscow BIOKHIMIYA in Russian Vol 50, No 12, Dec 85 (manuscript received 23 Apr 85) pp 2031-2039

KOSTROV, S.V., IZOTOVA, L.S., YEREMASHVILI, M.R., GALAKTIONOV, K.I., YURIN, V.L., KOROBITSIN, L.P., PIVOVAROV, A.P., PAVLOV, I.Yu., TYAGOTIN, Yu.V., FRIDLANSKIY, I.I., MARGULIS, B.A. and STRONGIN, A.Ya., All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow; All-Union Scientific Research Institute of High-Purity Biopreparations, Leningrad; Institute of Cytology, USSR Academy of Sciences, Leningrad

[Abstract] Comparative immunochemical analysis was conducted on selected human leukocytic interferons using a radioimmunoassay (RIA) technique and mono- and polyclonal antibodies elicited against interferon  $\alpha$ A. The RIA binding studies demonstrated that polyclonal antibodies reacted with  $\alpha$ F and  $\alpha$ N interferons, in addition to  $\alpha$ A, whereas all of the monoclonal immunoglobulins reacted only with  $\alpha$ A and  $\alpha$ N. A series of monoclonal antibodies was

found to bind to overlapping epitopes on the  $\alpha$ A molecule, which would simultaneously bind only two antibodies that differ in specificity. Denaturation studies demonstrated that biological activity of  $\alpha$ A correlated well with retention of antigenicity in heat-denaturation, but that in proteolytic denaturation with trypsin, chymotrypsin or pepsin biological activity was lost before antigenicity was affected. Since the in vitro concentration of interferon required for oligomer formation exceeds that attainable in vivo in the blood stream, any oligomer formation in vivo would have to occur on cell surfaces. Figures 4; references 20: 2 Russian, 18 Western.  
[284-12172]

UDC 577.125

#### NEUTRAL GLYCOSPHINGOLIPIDS OF MOUSE T CELL LYMPHOMA EL-4

Moscow BIOKHIMIYA in Russian Vol 50, No 8, Aug 85 (manuscript received 19 Oct 84) pp 1290-1294

DYATLOVITSKAYA, E.V., FOMINA-AGEYEVA, Ye.V. and BERGELSON, L.D., Institute of Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] Collections were conducted on the ascitic fluid of C57Bl/6 mice bearing T cell lymphoma EL-4, for isolation of the malignant cells and determination of shedding of neutral glycosphingolipids into the supernatant in analogy to previously demonstrated shedding of gangliosides [Dyatlovitskaya, EV, et al., Dokl. AN SSSR, 271(6): 1511-1513, 1983]. The major glycolipid components of the T EL-4 cells were identified as GlcCer, LacCer, GgOse<sub>4</sub>Cer and GgOse<sub>3</sub>Cer on the basis of TLC analysis. This study also represents the first demonstration that approximately 20% of the cellular glycosphingolipids are shed into the culture medium. Figures 1; references 23: 8 Russian, 15 Western.  
[285-12172]

UDC 612.124.017.1-06:577.152.633]-08

#### PRESENCE OF $\beta$ -ADRENORECEPTORS, FUNCTIONALLY ASSOCIATED WITH ADENYLATE CYCLASE, IN THE MEMBRANE OF PRECURSORS OF ANTIBODY-FORMING CELLS

Moscow IMMUNOLOGIYA in Russian No 3, May-Jun 85 (manuscript received 28 Jul 83) pp 13-15

ATAULLAKHANOV, R.I. and KOCHINA, I.S., Institute of Immunology, USSR Ministry of Health, Moscow

[Abstract] The expediency of synthesizing immunoregulatory molecules consisting of two functionally active centers and an antigen as a functional center selectively bonding with a clone of antigen-specific cells and a modifier of

the key membrane system capable of significantly influencing metabolism, division and differentiation of the lymphocyte, has been previously demonstrated. Considering the importance of cyclase enzymes of lymphocyte membranes in starting the reaction of these cells, it was suggested that substances modifying cyclase activity be included in bifunctional molecules as a center. In this work, a study was made of the presence of adrenalin receptors in antibody-forming cell precursors. The studies indicated stimulation of adenylate cyclase in mouse spleen cells in the presence of  $10^{-6}$ - $5 \cdot 10^{-2}$  M adrenalin. Adrenalin acts on the cyclase through  $\beta$ -receptors on the cell membrane. Specific blocking of these receptors with propranolol changes the stimulating influence of the adrenalin on adenylate cyclase. Adrenalin activation of adenylate cyclase in the lymphocyte membrane is recorded within 1 to 2 minutes after addition of the hormone. Figures 3; references 8: 6 Russian, 2 Western.  
[228-6508]

UDC 612.112.94.017.1]-08

USE OF INTERLEUKIN-2 TO ESTIMATE ALLOGENEIC SENSITIZATION OF T-LYMPHOCYTES.  
INTERLEUKIN-2 REACTION OF HUMAN LYMPHOCYTES SENSITIZED WITH ALLOGENEIC CELLS

Moscow IMMUNOLOGIYA in Russian No 3, May-Jun 85 (manuscript received  
21 Apr 85) pp 23-26

VOITENOK, N.N. and ZOBIN, V.D., Belorussian Scientific Research Institute  
of Hematology and Blood Transfusion; Minsk Medical Institute

[Abstract] The level of proliferation evoked by interleukin-2 apparently correlates with the number of sensitized T-lymphocytes in the total lymphoid cell pool. This article studies the possibility of estimating sensitization of lymphocytes based on the increase in their reaction to interleukin-2 in vitro. The work was performed on a model of allosensitization of human lymphocytes in a mixed lymphocyte culture. The reaction of the cells to interleukin-2 and allogeneic cells was studied during the period of reduction of the primary reaction and formation of memory cells. Memory cells sensitized in vitro by alloantigens responded to interleukin-2 much more intensively than unsensitized cells, indicating the possibility of using interleukin-2 to determine the sensitization of lymphocytes. Purified T cells should be used for this purpose, since non-T cells have a direct proliferative response to interleukin-2. Figures 1; references 11:  
3 Russian, 8 Western.  
[228-6508]

## COMPARATIVE STUDY OF IMMUNOMODULATING PROPERTIES OF NUMBER OF SYNTHETIC MURAMOYLDIPEPTIDE ANALOGS

Moscow IMMUNOLOGIYA in Russian No 3, May-Jun 85 (manuscript received 27 Jul 83) pp 37-40

STEPANOVA, Ye.N., KASHKIN, K.P., KITAYEVA, M.N. and ABASHEV, Yu.P.,  
Institute of Immunology, USSR Ministry of Health, Moscow

[Abstract] Phenotype correction of the immune response is closely related to the search for active nontoxic immunomodulators such as muramoyldipeptide. The purpose of this study was to estimate the immunomodulating properties of a number of domestic synthetic muramoyldipeptide analogs and determine some of the mechanisms of their action on the model of humoral immune response to a T-dependent antigen. It was shown that muramoyldipeptide and the analogs studied can be arbitrarily placed in the following sequence in terms of immunomodulating activity: N-acetylglucosaminoyl( $\beta$ 1-4)-muramoyldipeptide, muramoyldipeptide, 2-(N-acetyl-D-glucosamine-4-iloxy)-(R)-propionyl-L-alanyl-D-isoglutamine, D-alanyl-L-alanyl-D-isoglutamine. A correlation was found between the immunostimulating effect of muramoyldipeptide and its analogs in the system in vivo and mitogenic activity in vitro. The immunosuppressor effect of muramoyldipeptide and its analogs is apparently related to activation of a subpopulation of nonspecific T suppressors. Figures 2; references 10: 1 Russian, 9 Western.  
[228-6508]

UDC 616.153.962.4-097-089.816:621.928

## IMMUNOSORPTION. FROM INVESTIGATION TO THERAPY

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 85 (manuscript received 4 Apr 83) pp 9-14

LOPUKHIN, Yu.M., MAKHLIN, N.V., KULAYEV, D.V. and GORODETSKAYA, S.B.,  
II Moscow Medical Institute imeni N.I. Pirogov, Scientific Research Institute of Urology, RSFSR Ministry of Health

[Abstract] The arsenal of drugs for many diseases is growing all the time. One of the recent additions to this armamentarium is immunosorption--a method utilizing the antigen-antibody reaction (AG-AB) in highly selective isolation of fixed biomolecules. Currently, it is possible to remove immunoreactive material from blood or plasma by passing it through a thrombo-resistant immuno-adsorbent (extracorporeal immunosorption). In the near future, it will be used as a therapy for lupus nephritis, various malignancies, and organ transplantation. Initial attempts to use extracorporeal immunosorption showed its high selectivity and projected ways for further studies by:  
1) search for synthetic and semisynthetic analogs of expensive biologicals



for use as adsorbents; 2) development of a wide spectrum of AB-immuno-adsorbents using monoclonal AB; 3) investigation of physiological reactions involved in removal of large quantities of AB, complement components and other biologically active compounds; 4) development of synthetic controls for AB in the postoperative period; 5) development of methods for selective removal of immunocompetent cells and 6) development of simple separation methods for plasma prior to its extracorporeal treatment. References 68: 12 Russian, 56 Western.  
[227-7813]

UDC 616.366-002.1-053.9-085.276.4-036.8

#### EFFECTIVENESS OF IMMUNOSTIMULANT DIUCIPHON USE IN MIDDLE-AGE AND IN ELDERLY PATIENTS WITH ACUTE CHOLECYSTITIS

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 85 (manuscript received 29 Nov 83) pp 46-49

CHEREDEYEV, A.N. GORLINA, N.K., MAMATKULOV, S.M., ALEJNIKOVA, N.V. and SNISAR, N.A., Second Moscow Medical Institute imeni N.I. Pirogov

[Abstract] Immunological status during treatment of middle-age and elderly patients (57-84 years old) with acute cholecystitis was studied along with evaluation of the effectiveness of diuciphon immunostimulator. It was shown that the functional activity of T-cells was lowered in such patients with a somewhat less pronounced lowering of the B-cells. Treatment with diuciphon resulted in immunocorrective action on T-cell reactions. The number of T cells increased along with proliferative response of the lymphocytes to phytohemagglutinin; the activity of spontaneous suppressors of the lymphocytes increased. This positive dynamics of immunologic indices was accompanied by a satisfactory clinical effect, especially during the postoperative period. Figures 1; references 15: 8 Russian, 7 Western.  
[227-7813]

UDC 612.112.94.017.1:578.245].014.46:615.919:578.861.2

#### INTERFERON PRODUCTION BY RABBITS IMMUNIZED WITH STAPHYLOCOCCAL ENTEROTOXIN A

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 85 (manuscript received 24 Feb 84) pp 78-79

SHCHEGLOVITOVA, O.N., MENTKEVICH, L.M., NOSKOV, A.N. and YEZEPCCHUK, Yu.V., Scientific Research Institute of Epidemiology and Microbiology imeni N.F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Results of the production of immune and leucocytic interferon by rabbits immunized with staphylococcal enterotoxin A (SEA) are reported. The

following mechanism for the observed processes was proposed: After insertion of SEA, rabbit sensitization takes place evidence by initial production of interferon followed by production of specific antibodies. Lymphocyte sensitization was accompanied by Thy-1 antigen density change on the surface of T-lymphocytes. Concurrently, nonspecific suppressors against B-lymphocytes appear in T-cell population. This results in lower production of leucocyte interferon because B-lymphocytes are its principal producers. Figures 1; references 5: 2 Russian, 3 Western.  
[227-7813]

UDC 618.146-006.6-085.339:578.245]-092:612.112.94.017.1

EVALUATION OF IMMUNOLOGIC STATE OF UTERINE CERVIX CANCER PATIENT PRIOR TO AND AFTER TREATMENT WITH INTERFERON

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 85 (manuscript received 6 Jan 83) pp 50-52

NIKOLAYEVA, L.Ya., VASILYEV, B.V., LETSKIY, V.B. and SMORODINTSEV, A.A., Scientific Research Institute of Oncology imeni N.N. Petrov, USSR Ministry of Health, Leningrad

[Abstract] T-lymphocyte properties were studied on patients with preinvasive and invasive uterine cervix cancer prior to and after treatment with interferon by measuring total number of T-lymphocytes and their active fractions. T-cell blocking was discovered, a deficit of the humoral factor of the thymus and sensitivity of lymphocytes to theophyllin. The use of interferon normalized the level of active T-cells but decreased somewhat the total content of T-lymphocytes in peripheral blood. The latter phenomenon could have been caused by their migration towards the tumor centers where the interferon is bound and where the cytotoxic effect takes place.

References 25: 3 Russian, 22 Western.

[227-7813]

UDC 612.017.1:612.6.05

PHENOTYPIC CORRECTION OF Ir-GENE CONTROL OF IMMUNE RESPONSE DURING IMMUNIZATION WITH [T,G]-A-L CONJUGATES WITH SYNTHETIC POLYELECTROLYTES

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 85 (manuscript received 1 Aug 84) pp 21-24

PETROV, R.V., KHAITOV, R.M., NORIMOV, A.Sh., NEKRASOV, A.V. and KORYAKIN, S.A., Institute of Immunology, USSR Ministry of Health, Moscow

[Abstract] In recent years, a new method was developed for production of artificial T-independent antigens based on addition of haptens or weakly



immunologic protein antigens to polymer carriers. The mechanism of action of antigen polymer complexes--induction of lymphocyte response was assumed to be independent of T-cellular and Ir-genic control of immunogenesis. In this paper, it was shown that the artificial antigen-polyelectrolytic complexes are indeed Ir-independent. Artificial antigens (conjugates of polypeptide [T,G]-A-L) with polyelectrolytes were synthesized. [T,G]-A-l--synthetic copolymer of L-throsine, L-glutamic acid, L-alanine and L-lysine gives an immune effect with a narrow specificity, controlled by Ir gene. It was shown in mice experiments that this [T,G]-A-L covalently conjugated with polyelectrolytes induced antibody and cell mediated response, acquired properties of a thymus independent, highly immunogenic antigen and induced Ir-I-independent immune response. This resulted in conversion of genetically poorly responsive species into highly responsive ones. Figures 2; references 13: 9 Russian, 4 Western.  
[227-7813]

UDC 612.112.94.014.46:615.373.6

#### MECHANISM OF INHIBITING ACTION OF PLACENTAL GLOBULIN OF HUMAN LYMPHOCYTE RESPONSE IN MIXED CULTURES

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 85 (manuscript received 10 Jun 83) pp 34-38

ARIFKHANOV, R., Moscow Scientific Research Institute of Epidemiology and Microbiology imeni G.N. Gabrichevskiy

[Abstract] Previously, it was shown that normal human  $\gamma$ -globulin from placental plasma (PGG) was capable of inhibiting lymphocytic proliferation under in vitro conditions of mixed lymphocytic culture (MLC). The goal of the present study was to determine the mechanism of the response inhibition in MLC during the action of PGG. PGG and various antilymphatic preparations of domestic origin were used. Analysis of experimental data showed that the inhibitory action of PGG could not be explained by the cytotoxic action on lymphocytes cultivated in MLC. The activity of PGG was mediated through blocking antibodies with stimulant cells as the targets. The use of PGG during organ transplantation should facilitate the take of transplants by protecting them with blocking antibodies. PGG could produce long-term tolerance without inhibiting the immune response of the recipient. Figures 2; references 20: 10 Russian, 10 Western.  
[227-7813]

# IN VITRO LYMPHOCYTE STIMULATION OF POLYCATIONS. COMPARISON OF ADJUVANT, MITOGENIC AND POLYCLONAL ACTIVITY OF POLYMERS WITH DIFFERENT CHEMICAL STRUCTURE

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 85 (manuscript received 28 Jul 83) pp 27-30

ATAULLAKHANOV, R.I., GUBAREV, M.I. and GONCHAROV, V.V., Institute of Immunology, USSR Ministry of Health, Moscow

[Abstract] The goal of this study was to investigate the effect of polyvinylpyridine polycations on the proliferative activity of lymphocytes, to compare the mitogenic activity of polymers with adjuvant and polyclonal actions of these agents and to study the relationship of these properties to chemical structure of the polymer molecules. The following polymers were used: poly-4-vinyl-N-ethylpyridinium bromide (PVEPB), copolymer of 4-vinyl-N-acetylpyridinium bromide with 4-vinyl-N-ethylpyridinium-N-oxide (CVCBP), poly-4-vinylpyridinium-N-oxide (NOPVP), dextrans (kD of 90-100) and diethylamino derivatives of dextrans (DEAE, kD 500). It was shown that PVEPB activated proliferation of mouse lymphocytes *in vitro*. Modification of PVEPB with hydrophobic cetyl radicals resulted in decreased mitogenic properties and increased toxicity towards the lymphocytes *in vitro*. The mitogenic activity is not very structure-dependent: Polycations from PVP or dextran polymers have similar mitogenicity. Neutral polymer molecules with weak dipole groups (NO-PVP) do not activate division of lymphocytes *in vitro*. A direct correlation was observed between the mitogenic activity of these polymers and their activity to stimulate *in vitro* synthesis of antibodies, i.e., their adjuvant activity. Figures 2; references 7 (Russian). [227-7813]

UDC 616.24-006.62-085:615.28 T-Activin

## T-ACTIVIN IN COMBINED TREATMENT OF SMALL CELL LUNG CARCINOMA

Leningrad VOPROSY ONKOLOGII in Russian Vol 31, No 4, Apr 85 (manuscript received 26 Oct 84) pp 27-32

AUSEKAR, B.V., PEREVODCHIKOVA, N.I., KADAGIDZE, Z.G., DEREVNINA, N.A., VESKOVA, T.K., ARION, V.Ya. and BARYSHKOV, Yu.A., All-Union Oncological Scientific Center, USSR Academy of Medical Sciences; Second Moscow Order of Lenin State Medical Institute imeni N.N. Pirogov, RSFSR Ministry of Health, Moscow

[Abstract] Clinical trials were conducted with T-activin, a mixture of 1000-6000 dalton [MW] peptides isolated from calf thymus, in 13 patients with small cell lung carcinoma. The patients were in remission as a result of combination chemotherapy or chemotherapy + radiotherapy treatment. Treatment

with T-activin was intermixed with supportive chemotherapy and consisted of s.c. administration of T-activin in a dose of 100 µg daily for 5 weekdays, or once per week for 2-12 months. Total dose of T-activin amounted to 1000-3700 µg, depending on availability. Within three months of T-activin treatment T lymphocytes increased somewhat. Comparative data for the 13 patients treated with T-activin and 13 T-activin-untreated patients revealed median survival times of 113 weeks and 75 weeks, respectively. This difference was statistically significant ( $P < 0.05$ ); however, the median times of relapse for both groups--54 weeks and 45 weeks, respectively--were not significantly different ( $P > 0.05$ ). These observations suggest that further therapeutic studies with T-activin are warranted. Figures 3; references 11: 1 Russian, 10 Western.  
[214-12172]

UDC 616-092:612.017.1-064]-022.7

#### INFECTICUS DISEASES OF IMMUNE SYSTEM

Moscow IMMUNOLOGIYA in Russian No 5, Sep-Oct 85 (manuscript received 12 Mar 85) pp 7-11

KHAITOV, R.M., Institute of Immunology, USSR Ministry of Health, Moscow

[Abstract] A discussion is presented of the infectious diseases of the immune system, to include diseases caused by pathogens which directly damage links in the immune system, for example, intracellular parasites of the lymphocytes and macrophages. These include diseases caused by the HTLV viruses. The primary example of an infectious disease of the immune system is acquired immune deficiency syndrome (AIDS), which is discussed in this article. The history and statistics of AIDS in the USA, characteristics of risk groups, and clinical manifestations of AIDS are presented. The discovery of AIDS resulted from the introduction of modern immunologic tests to clinical practice and broad-scale testing of the immune status of patients. Further application of immune status screening is suggested. References 26: 4 Russian, 22 Western.  
[231-6508]

## ISOLATION OF ACTIVE FORMS OF OXYGEN BY ACTIVATED PHAGOCYTES

Moscow IMMUNOLOGIYA in Russian No 5, Sep-Oct 85 (manuscript received 3 Jan 84) pp 44-48

ZEMSKOV, V.M., BARSUKOV, A.A., BEZNOSENKO, S.A., ABDULOVA, G.A., SNOPKOV, V.A. and MIKSTAS, U.Ya., Institute of Immunology, USSR Ministry of Health, Moscow

[Abstract] A study is made of one element in functional activity, the production of active forms of oxygen. Production of active oxygen is evaluated by analysis of chemiluminescence of cells induced by sodium nucleinate. Various doses of sodium nucleinate in 0.85% NaCl solutions were administered to hybrid mice subcutaneously and perorally. The doses of sodium nucleinate used induced manifest infectious tachyphylaxis. A significant increase in chemiluminescence was observed after administration of 16 mg of the preparation, continuing for 48 hours, disappearing by the third day. Activation of chemiluminescence was less definite with 4 mg of the preparation. However, three times administration of 10-to-40 times less of the preparation was highly effective, significantly increasing chemiluminescence of macrophages for three days. Peroral administration of sodium nucleinate to humans with immune deficiency increases the formation of active oxygen radicals in neutrophils in the peripheral blood. Figures 4; references 6 (Russian). [231-6508]

UDC 612.94.017.1.014.46:615.371:579.873.21]-036.8-07

## STUDY OF MECHANISM OF ACTIVATION OF MOUSE T LYMPHOCYTES UNDER INFLUENCE OF MURAMOYLDIPEPTIDE AND ITS SYNTHETIC ANALOG IN VITRO

Moscow IMMUNOLOGIYA in Russian No 5, Sep-Oct 85 (manuscript received 18 Mar 84) pp 55-58

TEREKHOV, O.P., KASHKIN, K.P., KITAYEVA, M.N., ANDRONOVA, T.M. and STEPANOVA, Ye.N., Institute of Immunology, USSR Ministry of Health; Institute of Bioorganic Chemistry, imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow

[Abstract] It is suggested that the sensitivity of T lymphocytes of mice of various lines to the effects of muramoyldipeptide (MDP) and its synthetic analog be studied and that the conditions of activation of immunocompetent cells caused by these compounds be determined. Studies were performed on mice of the CBA and BALB/c line 2 to 4 months old with various polyclonal activators. A comparative study of proliferation of spleen cells of intact mice in vitro showed that even at optimal concentrations, the proliferation index of these compounds was significantly lower than when such T- and B-cell polyclonal stimulants as Kon A, phytohemagglutinin, and lipopolysaccharide were used. MDP and its synthetic analog simultaneously activated various

populations of T- cells. This generated polyclonal sensitivity of T-lymphocytes producing interleukin 2 to the effects of interleukin 1 and T-lymphocytes to the effect of interleukin 2. Figures 2; references 20 (Western).  
[231-6508]

UDC 612.017.1-064:613.863

#### EXPERIMENTAL REPRODUCTION OF PHENOMENON OF ANTIBODY DISAPPEARANCE

Moscow IMMUNOLOGIYA in Russian No 5, Sep-Oct 85 (manuscript received 5 Jul 84) pp 58-62

YEMEL'YANOV, B.A., KUZMIN, S.N., DZAGUROVA, M.S., MOSHIASHVILI, I.Ya. and PERSHIN, B.B., Central Scientific Research Institute of Vaccines and Sera imeni I.I. Mechnikov, Moscow

[Abstract] Stress may cause immune system disorders, varying as a function of force and duration of the stress factor. Persons in highly stressful situations sometimes manifest complete disappearance of some types of immunoglobulins, normal secretory and serum antibodies, as in athletes immediately following competition. The major task of the present work was to select an experimental model for reproduction of the phenomenon of disappearance of immunoglobulins to allow further study of the mechanism of the process. The influence of stress was studied on 40 chinchilla rabbits and 250 mongrel mice. Stress was applied by rotation in a vertical drum (rabbits) for 3 or 5 days and by forced swimming (mice). Blood studies were performed at various times during the application of the stress. The phenomenon of disappearance of normal antibodies and immunoglobulins was reproduced in the animals, with times of disappearance and dynamics of antibody levels similar to those observed in humans under extreme physical and emotional stress. The immune system reaction to stress was found to depend on individual specifics of the animals, intensity, and duration of the stress. Figures 3; references 13: 10 Russian, 3 Western.  
[231-6508]



SPECIFIC AND NONSPECIFIC FACTORS IN DEFENSE AGAINST INFECTION IN SWINE WITH ANTHRAX

Moscow IMMUNOLOGIYA in Russian No 5, Sep-Oct 85 (manuscript received 20 Jun 84) pp 80-81

SMIRNOV, B.S., MARININ, L.I., GARIN, N.S., LEBEDINSKIY, V.A., STEPANOV, A.V., MERETSKOV, V.V., OBORIN, V.A. and FOFANOV, P.Ye.

[Abstract] Swine are among the few animals in which local forms of anthrax are observed, making them a promising object for the study of the pathogenesis and immunogenesis of anthrax in man. The purpose of this work was to study the significance of nonspecific resistance factors and specific immune response in swine upon exposure to *B. anthracis*. Twenty-six 4- to 6-month-old pigs were infected by eating ground organs from rabbits which died of experimental anthrax. Blood samples were taken from the caudal vein to determine leukocyte count, blood formula, ESR, bactericidal activity of blood serum, serum lysocyme activity, beta-lysines, and preventive properties of serum. Determination of nonspecific resistance factors showed that the infectious process in pigs is accompanied by an increase in ESR, leukocytosis and a decrease in the quantity of lysozyme and beta-lysines. The blood formula showed a slight left shift and some neutrophilosis, with an increase in the quantity of eosinophils on the fourth or fifth day. This study established the significance of individual nonspecific resistance factors and the immune response in pigs with anthrax. References 6 (Russian). [231-6508]

SUPPRESSORS OF DELAYED-TYPE HYPERSENSITIVITY IN MICE TOLERANT TO ALLOANTIGENS

Moscow IMMUNOLOGIYA in Russian No 5, Sep-Oct 85 (manuscript received 10 Dec 83) pp 81-82

LYADOVA, I.V., CHERNYAKHOVSKAYA, I.Yu. and FONTALIN, L.N.

[Abstract] Previous works have suggested a method of inducing tolerance to alloantigens in mature mice and indicated the identity of cells causing rejection of transplants and delayed-type hypersensitivity effectors. The purpose of the present work was to study the specifics of development of delayed-type hypersensitivity to alloantigens in mice following treatment to induce tolerance by thymectomy followed after three days by i/v administration of a massive dose of splenocytes, then after 18-24 hours by i/v cyclophosphamide 200 mg/kg. Injection of donor spleen cells did not cause sensitization of the tolerant mice. The reactivity was specific. The data agree with the suggestion of the role of delayed-type hypersensitivity effectors in rejection of transplantates and the existence of correlation



between the rejection and delayed-type hypersensitivity reactions. The absence of delayed-type hypersensitivity in tolerant mice is related to the formation of specific delayed-type hypersensitivity T-suppressors, suppressing the effective phase of the reaction. The results suggest participation of an active suppressor mechanism in maintenance of tolerance, though the possibility of elimination or inactivation of antigen-reactive lymphocytes in tolerant mice must be considered. Figures 2; references 5: 2 Russian, 3 Western.  
[231-6508]

UDC 616.3+618.11]-006.04-073.75:576.8.097

#### RADIOIMMUNOMETRIC DIAGNOSIS OF GASTROINTESTINAL AND OVARIAN MALIGNANCIES USING MONOCLONAL ANTIBODIES

Leningrad VOPROSY ONKOLOGII in Russian Vol 31, No 5, May 85 (manuscript received 18 Oct 84) pp 36-42

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Moscow

[Abstract] Commercially-available solid-phase radioimmunometric test kits (International CIS, ELSA-CA-19-9 and -CA12-5K kits) were employed for the analysis of antigenic tumor markers CA-19-9 and CA-125 in selected groups of oncologic patients and control subjects. CA-19-9 was determined in the sera of 12 clinically healthy subjects and 112 patients with pancreatic, hepatic, gastric, and colonic malignancies, as well as in 52 patients with benign tumors or inflammatory conditions of the respective organs. CA-125 was analyzed in the sera of 10 clinically healthy women, 30 women with nonmalignant pathology of the uterus and ovaries, 24 with ovarian and uterine malignancies, and in 64 women with gastric, colonic, pancreatic, and/or mammary malignancies. The analytical data on CA-19-9 demonstrated that the test was not sensitive enough in the early stages of gastric and colonic malignancies to have diagnostic utility, and that CA-19-9 was elevated in only 37% of patients with hepatic metastases. However, the test may be useful in differentiation between inflammation and malignance in the pancreato-hepatoduodenal area. Although CA-125 is a specific marker for ovarian cancer, its differential utility in the case of malignant and benign tumors of the ovary does not exceed 63%. References 7 (Western).  
[215-12172]

CYCLIC NUCLEOTIDE INVOLVEMENT IN CERULOPLASMIN-MEDIATED IMMUNOMODULATION IN TUMOR GROWTH

Leningrad VOPROSY ONKOLOGII in Russian Vol 31, No 5, May 85 (manuscript received 3 Sep 84) pp 48-52

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Academy of Sciences, Kiev

[Abstract] C57B1 mice were employed in an evaluation of cyclic nucleotide involvement in immunomodulating effects exerted by ceruloplasmin (CP) in transplanted tumor-bearing animals. The mice were transplanted with human Lewis lung carcinoma and treated i.p. with human CP in a dose of 3mg/mouse/day for 10 days, with monitoring of thymic and splenic cAMP and cGMP levels and PHA-mediated lymphocyte transformation. Over a 3-week follow-up control mice with implanted tumors showed pronounced depression of PHA-mediated lymphocyte transformation, and depression of the cAMP/cGMP ratio in both organs as a result of reduction of cAMP levels and elevation of cGMP. CP-treated mice showed several-fold less depression of the blast response and elevation of the cAMP/cGMP ratio, basically due to elevation of the cAMP concentration and depression of the cGMP levels, demonstrating thereby the immunomodulating effects of CP--largely on the T cells--and the involvement of the cyclic nucleotides in this process. Essentially similar but less pronounced effects were obtained with zymosan (0.5 mg/mouse/day for 10 days, i.p.). Figures 1; references 12: 6 Russian, 6 Western.

[215-12172]

/13046

UDC 617.713-02:615.849.19]-07

MORPHOLOGICAL CHANGES IN CORNEA AFTER EXPOSURE TO YTTERBIUM-ERBIUM LASER BEAM  
(EXPERIMENTAL STUDY)

Moscow VESTNIK OFTALMOLOGII in Russian Vol 101, No 6, Nov-Dec 85 (manuscript received 6 Jan 85) pp 48-52

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(Chief: K.K. Zaytseva, MD), Military Medicine Academy imeni S.M. Kirov,  
Leningrad

[Abstract] The effect of an ytterbium-erbium laser beam on rabbit cornea was studied by histological, histochemical, and electron-microscopy methods. It was shown that exposure to the laser beam with 0.8 J energy and wavelength 1.54  $\mu\text{m}$  led to temporary damage at the beam entry site followed by restoration of the structural elements of the cornea. The reparation process was accompanied by stable hyperplasia of the anterior epithelium and a more compact but less ordered distribution of collagen fibrillae in the irradiated cornea zone, as compared to controls. In response to laser irradiation, alteration, proliferation, and scarring stages developed consecutively in the cornea. The effect of local thickening of the cornea can be viewed as the proof for this new method of therapy for endothelial-epithelial dystrophy of the cornea. Figures 4; references 4 (Russian). [261-7813]

/13046

THOSE MYSTERIOUS DOLPHINS

Moscow SELSKAYA ZHIZN in Russian 22 Nov 85 p 4

[Article by Yu. Semenenko, correspondent for "Selskaya Zhizn", Novorossiysk]

[Excerpts] For several years now scientists from the institute\* and Moscow State University have been carrying out a joint program for studying sea mammals. Dolphins are in motion their entire lives and never tire. They easily overtake their prey and are capable of outrunning a high-speed boat. Meanwhile, their muscle energy in no way corresponds to the speed they can develop. No less amazing is dolphins' capacity to orient themselves in their environment. With their eyes covered, the animals moved with confidence, caught fish without missing and retrieved tiny objects from the bottom of the swimming pool. The dolphins that live in the murky waters of the Amazon and Indus generally manage without the aid of vision, relying solely on their natural locating system. Cetaceans can manage for a long time without air, dive to a great depth and return quickly to the surface without any symptoms of aeroembolism. The brain of the dolphin is equal in mass to that of man and resembles it very closely in structure.

Candidate of Biological Sciences, Vyacheslav Alekseevich Rodionov, an employee at Utrishskiy Station, had many interesting things to tell me about dolphins then. Not everyone knows that the distant ancestors of cetaceans lived on dry land, and then in search of more favorable conditions they mastered the World Ocean. These mammals never leave the aqueous element which has become their home and never relax. Even in their sleep, otherwise they would simply drown. What is their secret? Now the mystery has been solved, for which the employees of the institute deserve great credit.

They have a complex apparatus at their disposal. The sharp styluses of recorders endlessly trace the irregular lines of encephalograms. Electrodes inserted into various points of the brains of dolphins provide a graphically clear picture of its work.

In all dry land creatures, including man, an encephalogram, a recording of the action currents of the brain, is always identical for both hemispheres. The dolphin is singular in this respect. I saw parallel, low-amplitude irregular lines which suggested that the animal was awake. Subsequently, from one of the hemispheres came signals of the previous character, while from the other came precisely the opposite, high-amplitude lines. This suggested that one half of the brain was . . . sleeping. In other words, dolphins and other

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\*Institute of Evolutionary Morphology and Ecology of Animals imeni

A.N. Severtsov

cetaceans sort of doze now and then, letting one and then the other hemisphere of the brain rest.

Many of the secrets of the life of dolphins were uncovered by the employees of Utrishskiy Station. It was conclusively proven that the sprinting speed of dolphins (up to 44 kilometers per hour) is made possible by both the streamlined shapes of their bodies and the special structure of their skin. Due to the contraction of the muscles and flexible regulation of the blood pressure, the resilient upper layer of the body is intricately attuned to the flow of the water, eliminating turbulence. Two thirds of the muscle system of cetaceans is concerned with the work of the tail. At the same time this main propelling agent, in contrast to similar organs in Pinnipedia and water fowl, does not make an idle motion. Every stroke is a working stroke. In addition, the fins have a controlled flexibility which adds to the speed.

It is a well-known fact that cetaceans continuously "probe" the area around them with ultrasonic signals. It has been determined that the generator of these waves is located in the anterior part of the skull where the nasal sinuses are. Listening to the scientist, I found myself thinking, what would it be like if we had such a perfect apparatus! Then it would be nothing for navigators and pilots to find their way at night, in fog, in clouds . . .

The latest research which is being conducted by the employees of the Utrishskiy Station has shed light on facts concerning the mass deaths of cetaceans. On gently sloping sandy beaches the ultrasounds they transmit fade away in a ground "trap" or dissipate in the direction of dry land. The animals falsely conclude that before them is the open sea. Further, if a member of their group emits a signal of danger or alarm, and it is during low tide, the school coming to the aid of their brother all run ashore where the skins of the cetaceans quickly dry out and they die from overheating.

There has also been vigorous debate about the "language" of dolphins and their close relatives. It is amazing that individual members of this order "talk with each other" without hinderance, although separated by dozens of kilometers. Man has also been able to penetrate this mystery of nature. One of the sources of communication has been determined. It is the larynx, which not long ago was disregarded by the majority of whale experts and considered a rudimentary remnant of the evolutionary process from the dry land ancestors of cetaceans.

Melodic trills of varying frequencies, whistles and squeals constitute the "speech" of dolphins. Their "language" is difficult to decode. Furthermore, the ultrasounds simply cannot be perceived by human ears. The head of the laboratory of bioacoustics, Yevgeniy Vasilevich Romanenko, does not exclude the existence of yet another source of communication and orientation of cetaceans which remains to be discovered.

I listen to the scientists' stories and cannot help but think what rich ground for research this is! Dolphins could become man's ideal helpers in studying the World Ocean! Bringing divers a needed object, delivering written communications, helping people in trouble and "tending" schools of fish are all tasks which cetaceans are capable of performing better than we are.



UDC 534.75:612.85

#### PROBLEM OF EVOLUTION OF OUTER EAR OF MARINE MAMMALS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 3, Nov 85  
(manuscript received 13 Jun 85) pp 749-751

LIPATOV, N.V., Institute of Evolutionary Morphology and Ecology of Animals  
imeni A.N. Severtsov, USSR Academy of Sciences, Moscow

[Abstract] The authors previously set forth a hypothesis according to which the reduction in the size of the outer ear upon transition to a marine life-style occurs only in those animals whose fur cover becomes soaked so that sound waves can penetrate it. If the fur cover retains air and becomes an acoustic shield, the outer ear evolves to be a closing tube, extending the length of the sound passages through the fur cover, meaning that the ear channels are not simply valves or rudimentary formations but specific adaptations. Results of experiments performed on seals confirmed this suggestion. The change in sound sensitivity was determined upon shielding of the ear with foam rubber, removal of hair from the outer ear and initial portion of the ear passage, and restoration of filling of the outer ear with air. It was found that the skin cover of these animals is a significant obstacle for sound waves at frequencies over 1 KHz, and that the auditory threshold of the seals under water is determined by the tympanal conductivity, with sound perceived by the outer ear, not by the ear passage. Figures 1; references 12: 10 Russian, 2 Western.  
[208-6508]

UDC 577.175.328

#### PRIMARY STRUCTURE OF SEI WHALE PROLACTIN

Moscow BIOKHIMIYA in Russian Vol 50, No 9, Sep 85 (manuscript received  
6 Mar 85) pp 1528-1534

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Hormone Chemistry, USSR Academy of Medical Sciences, Moscow

[Abstract] Standard techniques of peptide chemistry were employed in an  
analysis of the amino acid sequence of sei whale (*Balaenoptera borealis*)



prolactin, concentration on two CNBr fragments: one 69 amino-acids-long and the other consisting of 41 amino acids. A structure is proposed for the prolactin molecule of the sei whale, consisting of 199 amino acids in a single chain with three S-S bonds. In comparison with other species, most of the amino acid substitutions occur in the 132-166 segment, indicating that this region is responsible for species specificity but has no significance for biological activity. Figures 3; references 12: 5 Russian, 7 Western.  
[281-12172]

UDC 577.171

AMINO ACID SEQUENCE OF REDUCED AND CARBOXYMETHYLATED ALPHA- AND BETA-SUBUNITS OF MINKE WHALE LUTEINIZING HORMONE

Moscow BIOKHIMIYA in Russian Vol 50, No 12, Dec 85 (manuscript received 6 Mar 85) pp 1972-1986

KARASEV, V.S. and PANKOV, Yu.A., Institute of Experimental Endocrinology and Hormone Chemistry, USSR Academy of Medical Sciences, Moscow

[Abstract] Standard techniques of peptide chemistry were employed in an analysis of the amino acid sequence of minke whale (*Balaenoptera acutorostrata*) luteinizing hormone, in analogy to studies previously conducted on sperm whale luteinizing hormone [Pankov, Yu.A. and Karasev, V.S., *Biokhimiya*, 49:111-126, 1984]. The alpha-subunit was determined to consist of 96 amino acids, and the beta-subunit of 118. The alpha-entity contained two carbohydrate chains, while the beta-subunit only one. In all respects, the amino acid sequence was identical to that of the sperm whale. Both species are distinct from other animals in that the N-terminal amino acids of the beta-subunit consist of proline rather than serine, as is the case with human luteinizing hormone and that of the other species tested. Figures 2; references 13: 4 Russian, 9 Western.  
[284-12172]

/13046

MEDICINE

ASSOCIATION PRODUCTION OF AEROTHERAPEUTIC BURN TREATMENT UNITS

Kiev PRAVDA UKRAINY in Russian 28 Dec 85 p 4

[Excerpt] The Odessa Refrigeration Machinery Production Association has organized series production of aerotherapeutic units (ATU) for treating wounds and burns.\*

These units have earned wide renown for the association, although they are not its main product line. The members of the group which developed the new unit--G.S. Antonenko, general director of the association; V.G. Tikhiy, head of the association's special design-and-technological bureau; M.Ye. Lemberg, chief project designer; and V.P. Tsaplev, head of a team of assemblers--have been named USSR State Prize laureates for developing it and introducing it into practice.

"We are now producing five modifications of the ATU, including stationary and portable ones," related G.S. Antonenko. "The most difficult problems were solved jointly with specialists of the USSR Academy of Medical Sciences' Moscow Institute of Surgery imeni Vishnevskiy."

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\*See also the Daily SNAP, September 23, 1985, p 2, col 1

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CSO: 1840/298

INFLUENCE OF BLOOD DONATION ON LEVEL OF PHYSICAL ACTIVITY OF ATHLETES

Moscow GEMATOLOGIYA I TRANSFUSIOLOGIYA in Russian No 7, Jul 85  
(manuscript received 2 Jan 84) pp 45-48

BOYCHUK, L.V., MAKAROVA, G.A., YAKOBASHVILI, V.A., PODDUBNAYA, V.A. and  
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Blood Transfusion Station

[Abstract] A study was made of the immediate and prolonged influence of  
exfusion of 450 ml of blood on the physical working capacity of athletes.  
Studies were performed during the early stages of the training cycle on  
volunteer students from Krasnodar Physical Culture Institute, 20 to 30 years  
of age. Two types of bicycle ergometer tests were used to determine the  
aerobic and anaerobic components of working capacity. In the short term,  
no significant changes were found. This is explained by the stimulation  
of the hypophysis-adrenal and sympathetic-adrenal systems after exfusion.  
Twelve to 13 days after exfusion, with stable values of maximum oxygen  
consumption, some increase in absolute and particularly relative anaerobic  
metabolic index was found, as well as a reliable decrease in the content of  
lactic acid in the blood after 6 minutes of exercise and the rate of lactic  
acid accumulation. Measured blood donation during the preparatory period  
of a training cycle thus causes no significant decrease in physical working  
capacity. References 8 (Russian).  
[1011-6508]

USE OF METHODS OF IMITATION MODELING IN BLOOD SUPPLY CONTROL PROBLEMS

Moscow GEMATOLOGIYA I TRANSFUSIOLOGIYA in Russian No 7, Jul 85  
(manuscript received 5 Dec 83) pp 48-51

ZANKIN, Yu.G., KOBELYATSKIY, V.F. and KOCHAMOSOV, V.V., Central Scientific  
Research Institute of Hematology and Blood Transfusion, USSR Ministry of  
Health, Moscow

[Abstract] The purpose of this work was to construct, by means of imitation  
modeling, a generalized model to allow simple, effective computation of the

optimal blood supply reserve without constantly tracking current information on consumption and replacement of preserved blood supplies. A blood transfusion station or department is looked upon as a nonsteady queueing system with arbitrary arrival and servicing of requests. The optimization criteria selected were the reliability of available blood supply and percentage of blood at the critical age. The method of algebraic recurrent equations was used to construct the model. The generalized model allows not only quantitative evaluation of the effectiveness of a control strategy selected for maintaining the blood supply at a station or department, but also prediction of probable losses and reliability of the blood supply using simple graphic methods and a desk top calculator. Figures 5; references 6: 2 Russian, 4 Western.  
[1011-6508]

#### DIALOGUE ON ARTHROPLASTICS, OR WHERE TO GET SPARE JOINTS

Moscow KHIMIYA I ZHIZN in Russian Vol 250, No 10, Oct 85 pp 55-59

VOLFSON, S.A., Institute of Chemical Physics, USSR Academy of Sciences and PAVLOV, V.P., Arthro-Center, Institute of Reanimatology, USSR Academy of Medical Sciences

[Abstract] Arthroplastics is an operation aimed at reconstructing joints, their functions and free movement. A review of past attempts to replace whole joints is reported, covering metallic, ivory, and different plastic materials. Acrylic cement is highlighted as the material currently used in fixation of prostheses and bones. Acrylic cement is a dual component material: a liquid monomer mixed with powder filler directly at the surgical site, leading to a rapidly setting mass. One of the crucial problems is biocompatibility. Hundreds of different construction materials have already been patented. The most promising are the norplastics; in their synthesis, the filler particles act as the polymerization centers for the monomers so that macromolecules grow out of their surfaces. Their properties may be altered in many ways by changing the fillers (including the use of mineral substances, analogs of bone tissue), catalysts and monomers. Their texture could be made porous so that they could resemble bony tissue.  
[269-7813]

/13046

UDC 577.156.1

PURIFICATION OF EXTRACELLULAR  $\alpha$ -AMYLASE BACILLUS SUBTILIS ON NATURAL ADSORBENTS

Kaunas TRUDY AKADEMII NAUK LITOVSKOY SSR: SERIYA V in Russian Vol 2 (90), 1985 (manuscript received 21 Sep 83) pp 79-83

BALSIS, A.B., BAKHMATOVA, I.V. and CHYURLIS, T.K., Institute of Biochemistry LitSSR Academy of Sciences

[Abstract] Amylases isolated from culture medium of *Bacillus subtilis* bacteria are important agents in food, paper, and pharmaceutical industry, as well as in agriculture. A two-stage purification method was reported for extracellular  $\alpha$ -amylase ( $\alpha$ -1,4-glucan 4-glucanhydrolase) from a culture medium of *Bacillus subtilis* R 623 using natural adsorbents: soluble starch in the first stage, and liver glycogen in the second. This method yielded a 60-fold purified enzyme suitable for determinations of physical-chemical and kinetic properties. It was proposed that this method could possibly be used also in purification of other amylases. Figures 1; references 20: 10 Russian, 10 Western.  
[1034-7813]

UDC 616.98:579.861.2]-078.73

RAPID COAGGLUTINATION METHOD FOR TYPING STAPHYLOCOCCAL A AND B TYPE ENTEROTOXINS USING SENSITIZED ANTIENTEROTOXIC STAPHYLOCOCCI ANTIBODIES CONTAINING PROTEIN A

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 85 pp 71-72

FLUYER, F.S., Institute of Epidemiology and Microbiology imeni N.F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] A simple, rapid, and highly sensitive method for coagglutination of staphylococci was proposed that could be used in rapid determination of the type of enterotoxin produced and of their quantity. This method produces results in a matter of minutes, while a comparable gel precipitation method requires 12-72 hours for completion. The B enterotoxin producers were identified in staphylococci strains isolated from food poisoning patients, from intestinal infections, and from bacilli carriers, in 46.1, 36.4, and 1.5% of the cases, respectively.  
[227-7813]

FORMATION OF LIQUID CRYSTAL MICROPHASES IN DOUBLE-STRANDED NUCLEIC ACIDS AND SYNTHETIC LOW MW POLYNUCLEOTIDES

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 27, No 11, Nov 85  
(manuscript received 13 Feb 84) pp 2266-2273

SKURIDIN, S.G., LORTKIPANIDZE, G.B., MUSAYEV, O.R. and YEVDOKIMOV, Yu.M.,  
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[Abstract] An evaluation was conducted on CD spectra to assess the increase in the intensity of the absorption band due formation of liquid crystal microphases in DNA molecules isolated from salmon sperm and low MW synthetic polynucleotides. The studies, conducted on polyethylene glycol solutions, were intended to examine factors responsible for the optical activity of such microphases. Linearization of the kinetic plots demonstrated that the appearance of an intense band in the CD spectra of liquid crystal phases is autocatalytic in nature: condensation of the DNA molecules after neutralization of negative charges on phosphate groups in polyethylene glycol solutions leads initially to an ordered liquid crystalline microphase, followed by helical twisting of this phase with a corresponding negative band on the CD spectrum. The direction of the helical twist in the polymers in the liquid crystal phases depends on their energies of interaction, which in turn are determined by the nature of the macromolecule and of the solvent. The fact that the kinetics of a positive band of poly(dA).poly(dT) and of the negative band of poly(dA-dT).poly(dA-dT) are virtually identical, indicates that the formation of this family of liquid crystalline phases involves essentially identical mechanisms. Figures 4; references 19: 12 Russian, 7 Western.  
[289-12172]



## COMPENSATED STRUCTURE OF LIQUID CRYSTAL NUCLEIC ACID MICROPHASES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 285, No 3, Nov 85  
(manuscript received 4 Jun 85) pp 713-716

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[Abstract] The purpose of this work was to determine the reason for disappearance of intensive bands in the CD spectra of liquid crystal microphases formed from nucleic acid molecules in water-salt solutions of polyethylene glycol with increasing temperature. It is found that the DNA molecules and synthetic polynucleotides form liquid-crystal microphases, the structure of which at certain temperatures may become compensated, i.e., under these conditions the properties of the initial liquid-crystal microphases become similar to the properties of nematic liquid crystals. Figures 4; references 14: 7 Russian, 7 Western.  
[208-6508]

/13046

# STUDY OF MECHANISM OF MICROWAVES' INFLUENCE ON MODEL MEMBRANOUS SYSTEMS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA No 1, Jan-Feb 85, pp 41-51

[Article by I.G. Akoyev, V.V. Tyazhelov, O.V. Kolomytkin, S.I. Alekseyev, and P.A. Grigoryev from the Institute of Biological Physics of the USSR Academy of Sciences, Pushchino]

[Text] The results of research on the effect of microwaves on the functions and structure of the hematoencephalic barrier have been reported in the review of Albert (1979) as well as in the work of Frey et al. (1975). Adey (1981) has called the attention of researchers to biological membranes as possible targets of the effect of microwaves.

In fact, the experimental research of E. Sh. Ismailov (1971) has shown a change in the permeability of erythrocyte membranes under the effect of 1-3 GHz microwaves. These effects have developed rather slowly and have had a significant consequence. They could be explained as the effect of microwaves on the conformation state of the protein-lipid complexes that form the "body" of the membrane, with a mediated effect on transmembranous ion transport as well as a direct effect on the transport subunits in the membrane (canals, inophoric complexes, etc.) without a noticeable impairment in the global properties of the membrane as a carrier.

Research in the direction of the first possible explanation was begun using fluorescent probes for the various elements comprising the membrane.

The second direction was researched on artificial bilayer lipid membranes [BLM] that were modified by various agents (canal-forming agents, ion-transfer-type agents, etc.) (Tyazhelov et al. 1978a and 1978b and Alekseyev et al. 1980 and 1982) and concurrently on a model of the postsynaptic membrane of the glutamate synapse (Kolomytkin et al. 1978 and 1982). Both groups of researchers showed the presence of a substantial effect of microwaves on selected objects.

The present article analyzes the results of the investigated effect of microwaves on the functioning of the two specified types of membranous models.

Experiments on Artificial Bilayer Lipid Membranes [ELM] Modified by Canal-forming Antibiotics

## Materials and Methods

**Preparation of membranes.** The present experiment uses lecithin membranes and membranes from total phospholipids of the brain of large cattle. The membrane-forming solution for the lecithin membranes was prepared according to the method of Muller (Muller et al. 1963). The separation of the total brain phospholipids was carried out in accordance with the method described by Keyts (1975), with subsequent extraction in acetone according to Folch et al. (1957). The source membrane-forming n-heptane solution contained 20 mg/mL phospholipids and 1 to 20 mg/mL cholesterolin. The membranes (source ELM [IBIM]) were formed by applying a small drop of forming solution onto a 0.5- to 1-mm diameter opening in the wall of a Teflon beaker that was submerged into an electrolyte (Figure 1). At the location of the opening, the thickness of the walls of the Teflon beaker did not exceed 0.1 mm. The pH of the electrolyte was maintained at 5.0. The volume of electrolyte in the quartz flask with a Teflon beaker was 2.5 mL. Membrane-conduction modifiers were added to the electrolyte during its preparation. Alameticin (for the lecithin membranes), gramicidin A, nystatin, amphotericin B, as well as valinomycin and tetraphenylborate at various concentrations were used as modifiers.

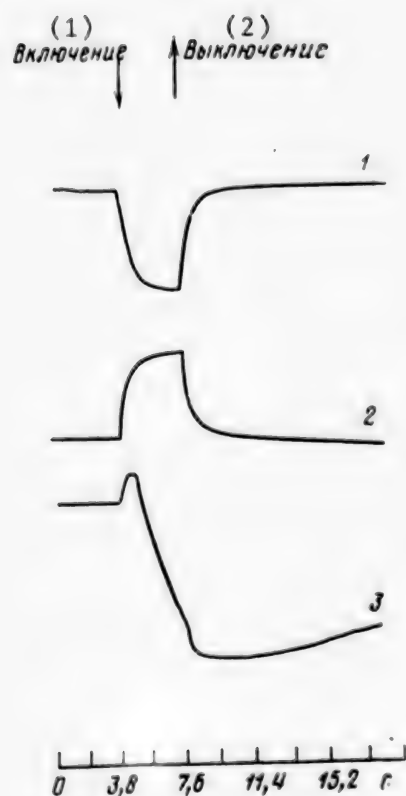


Figure 1. Form of the effects of a microwave field on ELM modified by alameticin (1) and amphotericin B, with a cholesterolin content in the BLM-forming solution of 8 (2) and 1 mg/mL (3).

Key:

1. Turned on
2. Turned off

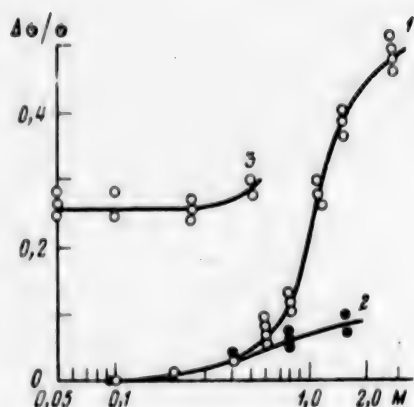


Figure 2. Function of the magnitude of the effect to the concentration of NaCl during modification of the BLM by nystatin (1) and amphotericin B (2) at specific absorbing power [SAP] = 70 w/kg, with a cholesterol content of 8 mg/mL in the forming solution; (3) magnitude of the effect as a function of the concentration of KCl in the electrolyte solution containing 0.5 M  $\text{CaCl}_2$  on both sides of the membrane, with the modifier, gramicidin C, and SAP = 200 w/kg.

Irradiation of object and registering of SAP. The irradiation of the flask with the membrane in the electrolyte was carried out by placing it in a waveguide with a transverse cross section of  $20 \times 250 \text{ mm}^2$ . The waveguide was connected to a high-frequency generator with an output power of up to 30 w at a frequency of 0.9 GHz. The high-frequency power absorbable in the flask depends essentially on the magnitude of the gaps between the walls of the flask and the waveguide. The distribution of SAP in the waveguide was extremely nonuniform. Therefore, the recording of the SAP for the area close to the opening with the membrane was implemented by measuring the electrolyte temperature in this area before and directly after the test exposure for each type of electrolyte used and its concentration. The measurements were made using a needle-shaped thermistor with a diameter of the working part of less than 0.5 mm. The duration of the test exposure was 10 sec. The electronic circuit used ensured the measurement of the temperature difference with an error of not more than  $0.1^\circ$ , which yielded a relative SAP measurement error of no more than 15 percent ( $\text{SAP} \sim 400 \text{ w/kg}$ ) during total heating in an exposure period on the order of  $1^\circ$ .

Recording of the magnitude of membrane conduction. Two electrodes were immersed into the flask electrolyte: one inside the beaker and the other from the outer side. The current between these electrodes, which have a fixed difference in the potentials on them, was used as a parameter that directly characterized the conduction of the membrane separating the internal and external volumes of electrolyte. The measurement circuit used made it possible to measure currents with an error of not more than  $10^{-10} \text{ A}$ . The electrodes themselves were fine electrical tubes (less than 1 mm) that were filled with agar-agar gel. The high distillate resistance ensured small distortions of the falling high-frequency field within the waveguide, and passing the waves through 120-mm long metal tubes protected the measurement circuit against penetration by the high-frequency electromagnetic energy of the field irradiating the flask. The total magnitude of the registered currents lay in the  $10^{-7}$

to  $10^{-9}$  A range. A number of experiments were performed by this method; however, a banded screened line was used as an irradiation device, which made it possible to make a number of measurements for the frequency of the irradiating field in a range up to 0.3 MHz.

## Results

The dynamic changes in the currents through the membrane and, consequently, the changes in its conductivity were registered when the flask with the membrane was irradiated by an electromagnetic field, the intensity of which provided an SAP in the electrolyte of more than 30 w/kg. The direction of the changes and the general character of the effect depends primarily on the type of modifier (Figure 1). For lecithin membranes modified by alameticin, the effect appears in the form of a rapid fall in conduction for 0.2 to 0.4 sec, after which one can observe a slowly continuing fall in conduction. After the exposure is terminated, the conduction of the membrane returns to its initial value as well as after two phases. For 0.5 to 1 sec after the irradiation is turned off, the conduction increases to that value that is equivalent to the rapid phase of the development of the effect in the beginning of the exposure. The value of the conduction returns to the source level after several minutes.

For phospholipid membranes modified by nystatin, the form of the effect depends primarily on the cholesterol content in the membrane. The rapid positive phase (increase in conduction) is preserved at all cholesterol concentrations. At a cholesterol content of 8 mg/mL, the second slow phase has the same direction. When the cholesterol concentration is decreased relative to 8 mg/mL, the sign of the slow phase begins to change, and the rate of change in conduction in the second phase of the effect increases.

For gramicidin-type modifiers, the form of the effect coincides with that for nystatin at high cholesterol concentrations in the membrane.

At the same time, the modification of the membrane by such an agent as amphotericin B leads to the development of an effect during microwave irradiation based on the type of effect in membranes with a small amount of cholesterol in the presence of a nystatin modifier.

The magnitude of the observed effect depends on the type of modifier and has a linear relation to the intensity of irradiation for all of them.

When the concentration of electrolyte in the cell is large, the effect decreases. The nature of the change in the magnitude of the effect resulting from the electrolyte concentration may depend primarily on the type of modifier (Figure 2). On the other hand, when the ion force of the electrolyte solution is kept constant, the decrease in the concentration of the ion-charge carriers through the membrane into the electrolyte does not, for practical purposes, change the registered magnitude of the effect (Figures 2, 3).

Analogous results (effects with a single positive response phase) were also obtained for valinomycin- and tetraphenylborate-type modifiers. Experiments on a membrane with a single canal that was formed by amphotericin B and a comparison of these results with data for a membrane with a large number of canals



indicated that the rapid phase of the effect is determined only by a change in the permeability of the canal in an open state; at the same time, the slow phase is positively related with the change in the relative mean lifetime of the canal in the open state.

The change in polarization of the irradiating electromagnetic field to one parallel to the membrane sharply alters the effect, eliminating the appearance of a rapid phase of the effect.

Experiments conducted at a frequency of 0.3 GHz (irradiation in a banded line) yielded analogous results with the exception of the fact that the magnitude of the effect relative to the SAP was substantially higher (5-fold to 10-fold).

#### Discussion of Results

It is noteworthy that the effect of the microwaves observed on the artificial bilayer phospholipid membrane was very common for all the modifiers used to modify the conduction of the model membranes. One could suggest that this effect is caused by the rapid heating of the membrane and the surrounding layers of the electrolyte during irradiation as a result of a local concentration of the electromagnetic field (up to three to four orders of magnitude with respect to SAP) at the opening of the beaker where the membrane is formed.

Actually, the general direction of the registered changes in conduction coincides completely in the majority of cases with the change in the direction of conduction when the electrolyte is heated. The instances of heterodirected changes (Figure 1) may be explained by the lag in the processes of the rearrangement of the membranes and the corresponding total conduction relative to the changes in conduction caused by the increase in ion diffusion close to the membrane during its rapid local heating.

From these positions, one can trace the changes in the magnitude of the effect when the frequency and polarization of the irradiating field are changed as well as when the electrolyte concentration is changed. In the latter case, the modulus of the dielectric permeability of the electrolyte and, consequently, the degree of concentration of the field on the membrane, the magnitude of local superheating, and the registered effect must increase with an increase in concentration. The high rates of formation of the initial phase of the effect and its dissipation after termination of the irradiation indicates that the dimensions of the area of local superheating are very small (not more than 0.1 to 0.2 mm). Naturally, the measurements made by the thermistor, which, in addition to everything else, are larger in their dimensions than the superheated zone, may not reveal these local superheatings even 1 to 2 sec after termination of the exposure.

However, preliminary quantitative theoretical estimates of possible values of local superheatings of the electrolyte close to the openings in the dielectric films are less than the values computed according to the magnitude of the formation rate of the reaction and the known temperature sensitivity of the membranous complexes. There is no complete explanation for the large magnitude of the formation rate of the reaction or for the sharp variability of the form



of the concentration curves (Figure 2) and certain dynamic features of the relation of the magnitude of the effect to the preceding effects (Figure 3).

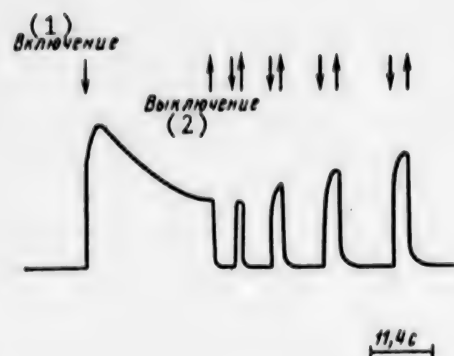


Figure 3. Form of the effect of a microwave field on BLM during repeated short-term irradiations. Modification by nystatin at a cholesterol concentration of 10 mg/mL, temperature of solution, 29 °C; SAP = 220 w/kg.

Key:

1. Turned on
2. Turned off

At the same time, there is no doubt that the aforementioned local heatings determine an essential, although still quantitatively undetermined part of the total effect.

In any case, one must suggest that the effect detected on the simplest models has a significant weight in the formation of reactions of complex biological systems to electromagnetic irradiation as a result of the wide propagation in real tissues of an analogous type of nonuniformities of the most diverse scales.

#### Investigation on a Model of a Postsynaptic Membrane of a Glutamate Receptor

##### Materials and Methods

**Preparation of the model membrane.** The research was conducted in a standard measuring cell made of Teflon that is used for working with artificial ELM. Both compartments of the cell were filled with an aqueous solution of 2 M KCl and 5 mM Tris-HCl with a pH of 7.1. The compartments were separated by a Teflon film that had a diameter of 10  $\mu$ m. The Teflon film had an opening with a diameter of 0.5 to 2 mm, on which an artificial membrane was shaped according to the method of Muller (Muller et al. 1963).

Fragments of postsynaptic membranes were isolated from the giant synaptosoma of a rat brain and were embedded into the artificial membranes as described by Kolomytkin and his co-workers (Kolomytkin et al. 1978).

**Technology of the effect of microwaves.** The microwave field of a capacitor connected to the output of a G2-20 generator was used to irradiate the model membrane. The brass plates of the capacitor were insulated from the solution by a polyethylene film with a thickness of 0.3 mm. The IELM was located

between the capacitor plates and was parallel with them. Frequencies of 400 and 750 MHz were used.

Determination of the SAP. The SAP, which was determined according to the rate of heating of the electrolyte, was used as the magnitude characterizing the absorption power in the cell of the electromagnetic field [EMP]. SAPs of 50 to 200 w/kg were used.

Determination of the ion conduction of the membrane. The electrical conduction of the membrane determined its ion conduction. A Keysly-301 amplifier was used to measure the electrical current through the membrane in a voltage holding mode. The measurement error of the electrical conduction was determined by the properties of the membrane and is shown in the graphs.

## Results and Discussion

Effect of microwaves on a bimolecular lipid membrane. IELM, which did not have fragments of postsynaptic membrane embedded in them, did not have reliable electrical conduction, and, when such membranes were irradiated, the change in their electrical conduction lay below the sensitivity of the measuring equipment, constituting a magnitude of 3 to 5 picosiemens.

Effect of microwaves on a single ion canal. A single ion canal in the model membrane was observed following the addition to the cell of 1 mg/L of fragments of synaptic membranes. In the open state, the electrical conduction of the canal attained 1,300 picosiemens and above.

After the start of the effect of the electromagnetic source [EMI], the electrical conduction of the open state of the canal increased rapidly and continued to be in a state of increased electrical conduction (a level of 1,400 picosiemens) for the entire period of the effect of the EMI. After termination of the effect of the EMI, the electrical conduction returned to the source state. Repeated on-switching of the EMI caused the same effect. The effects were rapid and completely reversible.

The effect of the EMI on the electrical conduction of the membrane depended upon the absorption of the power from the radiation in the cell solution. The relative change in the electrical conduction increased in proportion to the increase in the SAP.  $\Delta g/[g \times (SAP)] = (3.5 \pm 0.5) \times 10^{-4} \text{ w}^{-1} \times \text{kg}$ . Regardless of the source conduction of the canal, the relative change in its electrical conduction under the effect of the EMI was subject to one law.

Effect of microwaves on a membrane with a large number of ion canals. In the case in which a large number of ion canals were functioning in a membrane, which was accomplished by increasing the concentration of synaptic membrane fragments in the cell solution (50 mg/L), a linear law of the change in relative electrical conduction when there was an increase in SAP was also in effect; however, the slope of the graph of the given relation was substantially lower.  $\Delta g/[g \times (SAP)] = (1.7 \pm 0.25) \times 10^{-4} \text{ w}^{-1} \times \text{kg}$ . One can find an explanation for this fact by considering that the EMI facilitated the increase of the probability of finding the canal in a less conductive state.

Investigation of the mechanism of the effect of microwaves. It is known that one of the mechanisms of the effect of an ultrahigh frequency (UHF) EMI is connected with heat emission. The proportionality that was shown of an increase in the relative conduction of the ion canal to an increase in the absorption in the cell solution of the radiation power made it possible to suggest a thermal mechanism of the effect of the UHF field on the ion canal.

However, average heating of the solution in the cell under the effect of the UHF field cannot explain the observed effect. Actually, the mean temperature increases in a linear manner after the UHF field is switched on inasmuch as the cell is an adiabatic vessel. Consequently, the increase in the electrical conduction of the membrane, which was caused by an increase in the mean temperature of the solution, must also continuously increase in time in a linear manner. However, in reality, after the UHF field is switched on, the electrical conduction of the membrane rapidly increases to a certain value and then remains practically unchanged. This indicates that the increase in the electrical conduction of the membrane resulting from average heating of the solution is very low and cannot explain the observed increase in electrical conduction under the effect of the UHF field.

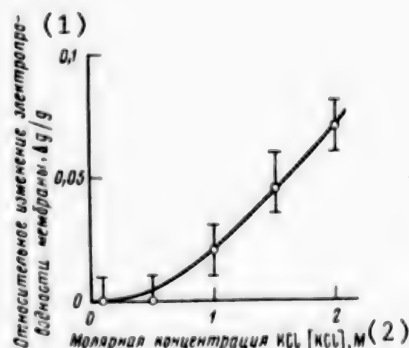


Figure 4. Relation of the relative change in conduction of the open state of the canal under the effect of a UHF field (400 MHz, SAP = 200 w/kg) to the concentration of KCl in the electrolyte.

Key:

1. Relative change in electrical conduction of the membrane, g/g
2. Molar concentration of KCl, M

An explanation of the data obtained may consist in assuming (1) the presence of effects of a nonthermal nature and (2) selective thermal heating of the membrane itself or a small area of the cell solution adjacent to the membrane.

The first supposition was verified by investigating the effect on electrical conduction of the channel of a different electrolyte concentration in the cell while varying the other conditions of the experiment. The results of the experiment, which are shown in Figure 4, indicated that when there is an increase in the molar concentration of KCl from 0.1 to 2 M, the relative electrical conduction of the ion canal increased in a nonlinear manner. Additional research is necessary to explain this phenomenon by a thermal mechanism of the effect of the microwaves.

Thus, research on the model of the postsynaptic membrane of the glutamate synapse revealed the effect of microwaves on the function of the ion canals of the membrane. The degree of change in ionic permeability increased with an increase in SAP. A qualitative similarity of the action of microwaves and the heating of the chamber solution was revealed; however, the action of the microwaves was more significant when there was even heating of the chamber solution, apparently, resulting from supplementary local emission of heat in the near-membrane area and in the membrane itself or in its individual points.

In addition, when the molar concentration of the solution increased, the effect of the action of the microwaves on ion permeability bore a nonlinear character. All of the aforementioned has made it difficult to see an explanation solely in the framework of the thermal hypothesis of the effect of microwaves without additional research.

On the other hand, it is necessary to allow for the fact that, by virtue of the special geometry of the chamber used, a local concentration of the EMP at the opening of the Teflon partition and a local heating of the solution around the membrane at a magnitude different from the mean increase in the temperature of the entire cell solution occur during the effect of the microwaves. Such local heating could be sufficiently large to change the ion permeability of the membrane canals. Therefore, supplementary computations and experiments were conducted to estimate local heating in the chamber used.

#### Local Heating of the Solution in the Area of the Membrane Under the Effect of Microwaves

Supplementary computations and experiments were conducted to refine the local heating of the electrolyte in the Teflon partition of the chamber without and with a bilayer phospholipid membrane. In the first series of experiments, the effect of diameter in the Teflon enclosure on the magnitude of the temperature of the solution in the region of the opening was determined. The second series of experiments determined the permeability of dinitrophenol through the ELM under the effect of the microwaves.

Temperature measurement in the area of the opening. The effect of microwaves on the electrical conduction of the electrolyte in the cell in the absence of a BLM was investigated to estimate the increase in temperature in the area of the opening. The computation indicated that, in the given instance, the electrical resistance of the solution based on a direct current is determined by the volume of a sphere with a diameter equal to the diameter of the opening in the Teflon partition. The centers of the sphere and opening coincide. Thus, by knowing the magnitude of the change in electrical conduction for a given diameter of the opening, one can estimate the change in the temperature of the electrolyte solution in the area of the opening according to the formula

$$\Delta T = \frac{1}{k} \cdot \frac{\Delta g}{g}, \quad (1)$$

where  $\Delta T$  is the change in electrolyte temperature,  $\Delta g$  is the change in the



electrical conduction of the electrolyte,  $g$  is the initial electrical conduction of the electrolyte, and  $k$  is the temperature coefficient of electrical conductivity ( $K = 0.002 \frac{1}{K}$ ).

**Measurement of electrical conduction.** A four-electrode potential-holding circuit was used to measure the electrical conduction of the solution. A Dagan amplifier was used in these experiments. The use of a four-electrode potential-holding circuit was dictated by the fact that in experiments without a BLM, the resistance of the electrolyte in the area of the opening was comparable with (or less than) the resistance of the current-leading electrodes.

An estimate of the proton conduction of the BLM with dinitrophenol when the membrane does not contain any ion canals and where such conduction has a clear temperature dependence was used for an indirect estimate of membrane temperature. A reagent manufactured by Sigma (USA), which was dissolved in a standard, was used in the experiments with dinitrophenol.

### Results of Research

Heating the electrolyte in the area of the opening on which the BLM is formed. Figure 5 shows the change in the electrical conduction of an electrolyte of 2 M KCl in the cell during the effect of microwaves at various diameters of the opening in the Teflon cell partition. Curves A and B were obtained for diameters of an opening equal respectively to 0.5- and 1 mm. The arrows show the times of the on- and off-switching of the microwaves. The plottings presented in Figure 5 are reproduced well; the measurement error of the electrical conduction is shown on the plotting. When the microwaves were switched on, the lesser the diameter of the opening, the greater the relative increase in the electrical conduction. The increase in electrical conduction in the given instance was caused by the heating of the electrolyte in the area of the opening. The increase in electrolyte temperature in the area of the opening not only depends on the power of the microwaves but also on the electrical conduction of the medium.

Let us introduce the magnitude  $\lambda$ , which does not depend on the heat conduction of the medium: the rate of the relative change in the electrical conduction of the electrolyte in the cell at the initial moment after the microwaves are switched on is

$$\lambda = \left( \frac{1}{g} \cdot \frac{dg}{dt} \right)_{t=0} \quad (2)$$

where  $g$  is the electrical conduction and  $t$  is the time.

The value of  $\lambda$  at different opening diameters in the partition is determined from the plottings of Figure 5. An aqueous solution of 2 M KCl was in the cell.



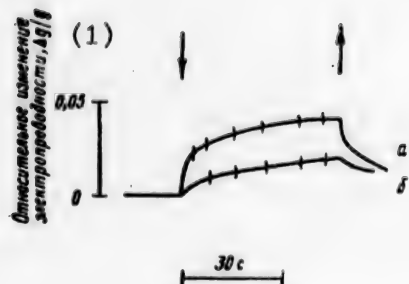


Figure 5. Effect of a SHF field on the relative electrical conduction of the electrolyte (2 M KCl) in the cell at various opening diameters in the Teflon chamber partition. Curves a and b were obtained for diameters equal respectively to 0.5 and 1 mm. The arrows indicate the times when the SHF field was switched on and off (750 MHz).

Key:

1. Relative change in electrical conduction,  $g/g$

If one knows  $\lambda$ , then it is possible to determine the growth rate of the electrolyte temperature in the area of the opening at the initial moment after the switching on of the microwaves from formulas (1) and (2)

$$\left( \frac{dT}{dt} \right) = \frac{1}{t} \lambda. \quad (3)$$

For an opening with a diameter of 0.5 mm, we obtain an initial temperature growth rate of 0.3 K/sec. Let us note that in the given instance, the mean heating of the entire electrolyte in the cell is small, 0.025 K/sec, which follows from direct temperature measurements. Thus, in the area of the opening, the electrolyte is heated significantly faster than the rate of the mean temperature increase in the entire solution.

From Figure 5, it follows that the magnitude  $\lambda$  decreases with an increase in the diameter of the opening in the 0.5- to 2-cm diameter range. Consequently, the initial temperature growth rate in the area of the opening also decreases when the diameter of the opening increases. The increase in the temperature growth rate in the area of the opening with the decrease in its diameter is explained by the increase in the density of the induced microwave current in the opening when the diameter of the latter decreases.

This experiment determined the mean temperature growth rate of a small region that was bounded by a sphere with a diameter equal to the diameter of the opening in the Teflon film. Obviously, transition to a lesser volume, which reacts to the temperature that is probably the temperature of the membrane, may yield greater rates of temperature growth. To verify this assumption, experiments were conducted with BLM in the presence of dinitrophenol.

The effect of microwaves on ELM in the presence of dinitrophenol. It is known that the permeability of the dinitrophenol itself through the lipid bilayer is

the limiting stage in the transport of protons through the artificial membrane. Therefore, the change in current through the membrane under these conditions reflects protein transfer processes. The temperature dependence of the electrical conduction of a BLM in the presence of dinitrophenol is known (Kozharkaru and Nenashev 1973). Therefore, one can estimate the equivalent increase in the temperature of the membrane itself during the effect of microwaves on the electrical conduction of BLM with dinitrophenol.

The experiment that was conducted revealed that the rate of temperature increase of the membrane itself equaled 1.5 K/sec at the initial moment of time after the microwaves were switched on for selected standard conditions of the experiment.

#### Discussion of Results

The general temperature estimates are presented in Figure 6. Under selected standard conditions of the given experiment at the initial moment after the microwaves were switched on, the temperature of the entire solution of the chamber increased 0.025 K/sec (direct measurements), the electrolyte temperature in the region of the opening in the Teflon partition without a membrane was 0.3 K/sec (indirectly based on the change in the electrical conduction of the electrolyte), and the temperature of the BLM itself with dinitrophenol was 1.5 K/sec (indirectly based on proton conductivity).

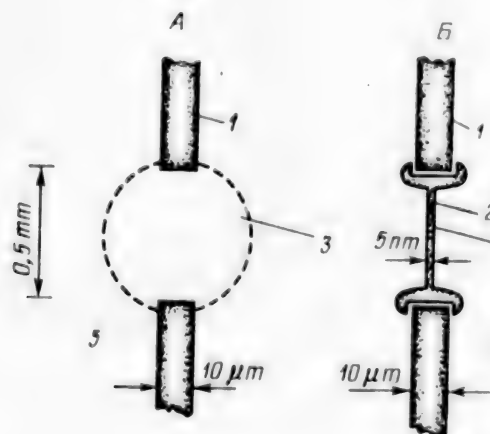


Figure 6. Diagram of the distribution of the rate of temperature increase in the cell at the initial moment after the irradiation was switched on--obtained from experiments involving the measurement of the electrical conduction of the electrolyte (A) and the membrane (B). One M KCl was in the cell; 1, Teflon; 2, membrane; 3, 0.3 K/sec; 4, 1.5 K/sec; and 5, 0.025 K/sec. The sizes of the openings, the Teflon partition, and the membrane are also presented.

The increase in the growth rate of the mean temperature, which was detected when the volume in which the measurement was made decreased, was, in all probability, caused by the concentration of the EMI in the opening of the partition. However, supplementary local energy emission in the near-membrane layers, which was caused by the heterogeneity of the medium at the electrolyte-membrane interface, has not been excluded.

## General Conclusion

The experiments on the two model membranous systems (BLM modified by canal-forming antibiotics and models of the postsynaptic membrane of the glutamate synapse) that are described in this article had essentially an identical result. In both cases, the shifts in ion conduction increased with an increase in the SAP of the microwaves and were qualitatively similar to the effect of heat. However, it was expressed significantly more strongly, which made it possible to suggest a stronger heat emission in the region of the membrane. This was indirectly confirmed computationally and experimentally.

The concentration of the EMP in the region of the opening in the Teflon partition played a significant role for the technical conditions of the experiment used (fitting the BLM on the opening in the Teflon partition). Nevertheless, the experiments conducted indicate a greater local heating in the near-membrane area than could be yielded by the local concentration of the EMP in the region of the opening. In addition, the nonlinear nature of the change in the effect of microwaves with a different molar concentration of ions and in the case of the substitution of one ion for another was manifested. All of the aforementioned complicates the solution to the problem of the mechanism of the effects of the microwaves. In any case, having noticed the important role of the thermal mechanism of the effect of microwaves, without additional research one cannot explain in its terms all of the distinctive features manifested of the effect of microwaves on membranous systems.

Moreover, the cycle of experiments conducted emphasizes the significance of local partitions in heterogeneous systems. The local partitions manifested in the model experiments are also entirely possible for real biological tissues. Such partitions may be one of the probable primary mechanisms of the biological effect of microwaves relative to lower levels of intensity.

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CSO: 1840/1015

MECHANISM OF THERAPEUTIC ACTION OF HELIUM-NEON LASER BEAM IN CORONARY HEART DISEASE

Moscow KHIMICHESKAYA MEDITSINA in Russian No 10, Oct 85 (manuscript received 19 Sep 84) pp 102-105

AGOV, B.S., ANDREYEV, Yu.A., BORISOV, A.V., BROUN, L.M., DVORKINA, M.I., ZHUK, A.Ye., IVANOVA, L.N., LORNEYEVA, N.T., NIKOLAYEVA, R.I., BELYAYEV, V.P. and ALEJNIKOV, V.S., Department of Internal Diseases (Charman: Prof B.I. Shulutko), Sanitation-Hygienic Chair, Leningrad Sanitation-Hygienic Medical Institute

[Abstract] Irradiation with red helium-neon laser light (HNL) is used therapeutically in a number of seemingly unrelated diseases. An attempt was made to determine the mechanism of action of HNL in angina pectoris. Tests were performed on patients and in animals. It was shown that exposure to red HNL light increased patients' tolerance to physical exertion in 71.15% of those tested; it improved microcirculation in bulbar conjunctiva, which reflects the general state of bodily blood circulation. Exposed to HNL, guinea pigs exhibited significant enlargement of vessels in the myocardium, skin and in the mesentery of small intestine. It was concluded that the therapeutic effect of HNL light was due to improved blood circulation in the microcirculatory system of myocardium. References 9 (Russian). [1035-7813]

/13046



UDC 615.357:577.175.829].015.4:616.831-005

ADRENERGIC MEDIATION OF CEREBROVASCULAR EFFECTS OF TRH (THYROTROPIN-RELEASING HORMONE)

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 5, Sep-Oct 85  
(manuscript received 9 Jan 84) pp 18-22

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[Abstract] Anesthetized cats and unanesthetized rabbits were studied in experiments designed to delineate the mechanism of cerebrovascular effects of TRH (thyrotropin-releasing hormone). Administration of TRH (1 mg/kg, i.v.) to animals with hemorrhagic shock led to an immediate increase in cerebrovascular blood flow that persisted for 10-20 min: an increase of ca. 61% in the cats and ca. 86% in the rabbits. Concomitantly, an increase in the discharge rate of sympathetic nerves was recorded, as well as a ca. 49% increase in the BP for 15-30 min, and a  $20 \pm 6.5\%$  increase in the heart rate. Analysis of results obtained with TRH administration in animals treated with various alpha- and beta-blockers demonstrated that the hypertensive effect of TRH was mediated via the alpha-adrenergic receptors of the vasculature. Cerebrovascular effects of TRH was ascribed to an effect on the beta-adrenergic mechanism. The efficacy of TRH in overcoming hypertension and in improving blood supply to the brain underlies its effectiveness in prolonging the survival times of animals in hemorrhagic shock. Figures 3; references 17: 5 Russian, 12 Western.  
[265-12172]

EFFECTS OF SINGLE CYAMIDE DOSE ON FREE AMINO ACID POOL IN RAT BRAIN

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 5, Sep-Oct 85  
(manuscript received 26 Jun 84) pp 25-28

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[Abstract] Outbred rats were employed in trials on the effects of cyamide [cyanamide]--an inhibitor of aldehyde dehydrogenase proposed for the treatment of alcoholism--on the brain pool of essential and nonessential amino acid. Cyamide was administered intraperitoneally in a dose of 60 mg/kg, followed in some experiments by intraperitoneal ethanol in a dose of 0.5 g/kg. Following cyamide administration, marked enhancement of the levels of taurine, cystine, and GABA was noted, whereas the increase in serine was less pronounced. Cyamide administration also induced depression of alanine, valine, leucine, phenylalanine, and of ethanolamine levels. Administration of ethanol after priming with cyamide had only the additional effect of diminishing the levels of cysteic acid and ornithine in the brain. However, the differences between the cyamide animals and the cyamide + ethanol animals were not significant. With currently available data, it is difficult to tell whether the effects of cyamide are due to elevation in acetaldehyde levels, or to some direct effect of the drug on protein or amino acid metabolism. References 24: 7 Russian, 17 Western.  
[265-12172]

UDC 615.216.5.015.2:615.847.8].03

MAGNETIC FIELD-CONTROLLED SITE-SPECIFIC DELIVERY OF CURAREMIMETIC DRUGS

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 5, Sep-Oct 85  
(manuscript received 27 Feb 85) pp 32-35

KHARKEVICH, D.A., ALYAUDIN, R.N., KASPAROV, S.A., NEMIROVSKIY, A.Yu.,  
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[Abstract] Trials were conducted on anesthetized cats to determine the feasibility of site-specific drug delivery using magnetic field-susceptible microcapsules. The agents under study were curaremimetics--diadonium and pyrocurine [sic]--entrapped in  $\leq 8$  nm microcapsules prepared from polyethyleneimine and nucleic acids in a suspension of ferroparticles. The microcapsules were injected intravenously and directed to a selected extremity by placing that limb in a magnetic field with 2000 oersted induction. The

studies with pyrocurine showed that within one minute the amplitude of evoked potentials in that extremity decreased to 47.5% of that in the control limb, which retained 75.5% of the amplitude of the preinjection value. After 3 min the amplitude in the experimental limb fell to 31% of the background control, and that in the control limb to 73.2%. Analogous results were obtained with diadonium, with full recovery in 10 min. These preliminary observations suggest that magnetic-field controlled drug delivery should receive further consideration and further elaboration. Figures 1; references 4: 1 Russian, 3 Western.  
[265-12172]

UDC 615.22:547.869.2

#### ETACIZINE PHARMACOLOGY

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 5, Sep-Oct 85  
(manuscript received 10 Apr 84) pp 43-49

KAVERINA, N.V., SKOLDINOV, A.P., SENOVA, Z.P., GRITSENKO, A.N.,  
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[Abstract] Pharmacological testing was conducted on dogs, cats, and rats to further define the scope of action of etacizine, a diethylamine analog of moricizine (Ethmozine, Etmozin). As an antiarrhythmic, etacizine was twice as effective as moricizine, with an effective duration of action 4- to 5-fold longer than that of the latter agent. Etacizine was also effective as an anti-ischemic agent and limited the size of experimental myocardial infarctions. The latter effects are not evident in moricizine, and resulted from changes in the side chain of phenothiazine, attributed to the diethylamine moiety. Figures 3; references 10: 7 Russian, 3 Western.  
[265-12172]

UDC 615.273.015.4.07

#### RHEOLOGIC EFFECTIVENESS OF DIHYDROXYACETONE

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 5, Sep-Oct 85  
(manuscript received 22 May 84) pp 63-65

BUGLOV, Ye.D., KOSTIN, G.M., BONDARENKO, V.S., DOVGALEV, S.I., GORELCHIK, K.I.  
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[Abstract] In vivo and in vitro studies were conducted on the rheologic effects of dihydroxyacetone (DHA) on addition to heparinized human blood and

i.v. injection into dogs. In the in vitro studies, DHA was added to give final concentrations of 34.5 to 138 mg% and injected in doses of 60-120 mg/kg for essentially equivalent doses in the in vitro and in vivo studies. In both cases, RBC aggregation was reduced and, consequently, fluidity improved (with concomitant reduction of viscosity) up to doses of 100 mg/100 ml. Above this level, DHA was far less effective. In addition, DHA was nonpyrogenic in rabbits and nontoxic in mice. The mechanism of action by which DHA exerts its effects on the rheologic characteristics of blood remain unclear. However, DHA appears to have potential clinical usefulness in improving microcirculation. Figures 2; references 1 (Russian). [265-12172]

UDC 615.214.3:547.745].015.44:612.35:612.262

#### EFFECTS OF PIRACETAM ON HEPATIC MITOCHONDRIAL RESPIRATION IN RATS WITH RESPECT TO SEX AND GONADECTOMY

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 5, Sep-Oct 85 (manuscript received 5 May 84) pp 81-84

TEREKHINA, A.I. and AGUREYEV, A.P., Scientific Research Institute for Biological Testing of Chemical Substances, Staraya Kupavna, Moscow Oblast

[Abstract] The effects of single and multiple doses of piracetam on hepatic mitochondrial respiration were studied on outbred rats with respect to sex and gonadectomy. The animals were injected with 100 mg/kg of piracetam s.c. once or for 6 days and sacrificed 2 h after the last injection. A single injection of piracetam did not affect the mitochondria. However, daily injection for 6 days led to a reduction in respiratory control (Chance technique), enhanced the rate of  $\text{NAD}^+$ -dependent substrate oxidation, diminished stimulation of substrate oxidation due to 2,4-DNP, and increased the rate of exogenous  $\text{NAD.H}$  oxidation by the amytal-antimycin A-resistant pathway. The metabolic changes induced by piracetam were more pronounced in the female animals than the males. However, piracetam did not alter mitochondrial respiration in animals treated with the agent 30 days after gonadectomy. The latter observation indicates that the action of piracetam on hepatic mitochondria is mediated by sex steroids. References 12: 9 Russian, 3 Western. [265-12172]

## EFFECTS OF BROMOCRIPTINE IN EXPERIMENTAL ALCOHOLISM IN RATS IN RELATION TO SEX

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 5, Sep-Oct 85  
(manuscript received 7 Jun 84) pp 96-101

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[Abstract] Pharmacological effects of bromocriptine (bromocriptine-mezilate-Sandoz) in outbred rats with experimental alcoholism were assessed in relation to sex in several studies, using intravenous doses of 1-10 mg/kg given i.v. A single administration of 1 mg/kg of bromocriptine was seen to facilitate lateral hypothalamus self-stimulation in the female rats, while inhibiting it in the male animals. A dose of 10 mg/kg, however, was inhibitory in both sexes. Administration of 1 mg/kg of bromocriptine per day for 20 days markedly reduced preference for ethanol only in the female rats, but led to an equivalent reduction in ethanol consumption in both sexes. Finally, a dose of 1 mg/kg decreased the rate of ethanol elimination from the blood stream in the female rats 3-fold, while the decrease in the male rats did not exceed 1.8-fold. Bromocriptine did not affect the reduction of blood ethanol characteristic in withdrawal. Bromocriptine was thus shown to be a more active agent in the female rats and, in the final analysis, normalizes animal behavior in terms of a decrease in alcohol consumption. Figures 1; references 21: 4 Russian, 17 Western.  
[265-12172]

UDC 615.277.3.015

CHOICE OF MODEL AND EVALUATION OF BASIC PARAMETERS OF DIOXADET  
PHARMACOKINETICS

Moscow KHIKIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 10, Oct 85  
(manuscript received 19 Nov 84) pp 1175-1179

KORSAKOV, M.V., FILOV, V.A., KRAYZ, B.O., KHRAPOVA, T.N. and IVIN, B.A.,  
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[Abstract] A detailed study of the pharmacokinetics of the antitumor drug dioxader was conducted using <sup>14</sup>C-labeled dioxader. The drug, which was labeled in the ethyleneimine group, was synthesized from 2,2-dimethyl-5-hydroxymethyl-(2,4-dichloro-1,3,5-triazine-6-yl)amino-1,3-dioxane and 2,3-<sup>14</sup>C-ethyleneimine. Twenty-two male rats were intraperitoneally administered labeled dioxader in doses from 10 mg/kg to 66.3 mg/kg and tail



blood was taken at 22 intervals from 10 minutes to 72 hours after administration. Early pharmacokinetics was also studied using intravenous administration. Rapid linear elimination of radioactivity was observed from 45 minutes to 240-360 minutes, followed by a slower elimination phase lasting 2-3 days. The first phase elimination constant was  $3.12 \pm 0.73 \times 10^{-3} \text{ min}^{-1}$ , independent of dose, and was calculated using a single event model with absorption. Blood clearance volume was  $1.09 \pm 0.14 \text{ ml/min}$ . The volume of distribution of the drug was greater than the blood volume, indicating rapid movement of the drug into organs and tissues. The absorption constant, calculated from the maximum of the kinetic curve, was  $0.317 \text{ min}^{-1}$ . Intravenous administration gave an activity peak at 10-15 minutes, indicating reabsorption, redistribution, or both. Figures 3; references 12: 10 Russian, 2 Western.  
[213-12126]

UDC 615.214.24:547.873.6].012.1.07

#### SYNTHESIS AND PHARMACOLOGICAL STUDY OF O,O'-DIACYL DERIVATIVES OF APOMORPHINE

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 10, Oct 85  
(manuscript received 25 Oct 84) pp 1192-1194

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[Abstract] Apomorphines, which have been used to inhibit the dopaminergic system in treating alcohol abstinence syndrome and schizophrenia, have undesirable side effects, such as emetic activity and short duration of action. In an attempt to overcome these obstacles, six O,O'-diacyl apomorphines were synthesized and studied. O,O'-Di(4-bromobenzoyl)apomorphine (I) was prepared from apomorphine hydrochloride and the acid chloride of 4-bromobenzoic acid. In a similar manner, the 4-fluorobenzoyl derivative (II) was produced from the acid chloride of 4-fluorobenzoic acid, the 4-methylbenzoyl derivative (III) from the 4-toluy acid chloride, and the 4-propoxybenzoyl derivative (IV) from 4-propoxybenzoic acid chloride. Compound IV was isolated as the nemonaphthalene-1,5-disulfonate. Compounds V and VI were the diacetyl and dibenzoyl derivatives, respectively. Modification of the apomorphine molecule sharply lowered acute toxicity. While for apomorphine the  $LD_{50}$  in mice was  $0.48 \text{ uM/kg}$ , for compounds I-III it was  $4.6 \text{ uM/kg}$ , for compound IV  $1.9 \text{ uM/kg}$ , for compound V  $0.76 \text{ uM/kg}$ , and for compound VI  $2.42 \text{ uM/kg}$ . However, only compounds V and VI, as well as apomorphine, elicited stereotypy (indicating antidopaminergic activity) in mice at doses of half the  $LD_{50}$ . Compound V did not differ from apomorphine in activity or duration of action. Compound VI elicited a duration of sedative action greater than that of apomorphine by a factor of 2.5, with prolongation of thiopental sleep increased by a factor of 2. Compound VI also had a weaker emetic effect in dogs than apomorphine. For apomorphine,

the ratio of emetic dose to sedative dose was 0.85, while for compound VI it was 1.46. The increased latent period observed with the derivatives, relative to apomorphine, suggests that they are converted to the active apomorphine in vivo. References 8: 4 Russian, 4 Western.  
[213-12126]

UDC 615.281:547.918.015.4.07

STRUCTURAL FEATURES OF STEROID GLYCOSIDES AND THEIR CONNECTION WITH  
HYPOCHOLESTEROLEMIC AND ANTIMICROBIAL ACTIVITY

Moscow KHIKIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 10, Oct 85  
(manuscript received 20 Aug 84) pp 1218-1221

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[Abstract] The structure-activity relationships of 70 steroid glycosides were studied using a complex computer program, STRAK. Hypocholesterolemic activity was evaluated in white rats orally administered 10 mg/kg of cholesterol with the test steroid. Thirty-nine of the 70 steroids exhibited activity in this test. All were spirostanol-type steroid glycosides, with three sugars in the  $R_1$  position, a hydrogen on  $C_1$ , and an OH or CO on  $C_{12}$ . None had a  $C_4-C_5$  double bond. Activity was absent in furostanol-type steroid glycosides, as well as compounds with 4-6 sugars at  $R_1$  and a  $C_4-C_5$  double bond. Thirty of the 70 compounds exhibited antimicrobial activity, as determined by agar diffusion. All active compounds had 4-6 sugars at  $R_1$ , connected to  $C_3$  but not via glucose, a spirostanol-type structure with hydrogen at  $C_1$  and  $C_{12}$  and no  $C_4-C_5$  double bond. An axial orientation of the  $C_{24}$  methyl group was also characteristic. Based on the results, deltonin, tomatin, degalactotigogenin, and digalonin are predicted to have hypocholesterolemic and antimicrobial activity, while deltozide is predicted to be inactive. Asperin and deglucolanatigogenin should exhibit only antimicrobial activity. References 8: 7 Russian, 1 Western.  
[213-12126]

## STUDY OF RADIATION-SENSITIVITY OF MICROORGANISMS CONTAMINATING THERAPEUTIC PREPARATIONS USING 'PASTEURIZING' DOSE OF IONIZING RADIATION

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 19, No 10, Oct 85  
(manuscript received 5 Nov 84) pp 1249-1251

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Ministry of Health, Moscow

[Abstract] Radiation-sensitive staphylococci and E. coli, as well as radiation-resistant hay bacilli and gram-positive spore-forming bacteria, were exposed to ten repetitive cycles of gamma irradiation. After each cycle, radiation sensitivity was determined. Radiation sensitivity was unchanged after the first four cycles. After ten cycles, a small increase in the number of cells resistant to lower doses was seen in both the radiation-sensitive and radiation-resistant organisms. No change in the ability of higher doses to kill all cells was seen. The data confirm the reliability of radiation "pasteurization" of medical preparations. References 5: 3 Russian, 2 Western.  
[213-12126]

## SEARCH FOR LOW MOLECULAR WEIGHT INTERFERON INDUCERS--IMPORTANT DIRECTION IN DEVELOPMENT OF CHEMOTHERAPY

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 3, May-Jun 85  
pp 16-18

PERSHIN, G.N.

[Abstract] Prospects for the utilization of human interferon in treatment of various diseases were reviewed on the basis of primarily domestic literature covering the premonoclonal interferon production era. An obvious fact was reinforced that rational use of interferon could be highly effective in therapy of infectious and noninfectious diseases. The most practical approach to the generation of interferon, in the view of the authors, was by the use of low MW inducers which showed activity in humans after oral administration. These inducers can be prepared in a highly purified state and thus they can be controlled quite effectively. The following inducers were listed among the promising therapeutics: tyloron [2,7-bis(2-diethylaminoethoxy)-fluoren-9-one], gossipol, levamisole. Unfortunately, these three inducers have not had any success in human trials. References 9: 8 Russian, 1 Western.  
[263-7813]

IN VITRO EFFECT OF NONACHLAZINE ON TEMPERATURE SENSITIVITY OF LYSOSOMAL MEMBRANES OF RAT MYOCARDIAL MUSCLE

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 3, May-Jun 85  
(manuscript received 31 Jan 84) pp 41-45

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[Abstract] In earlier studies, it was shown that nonachlazine (NC) administered after coronary occlusion elevated significantly the content of macroergic phosphates in the ischemia zone, probably due to increased coronary blood circulation and elevated oxygen reserve in myocardium. The question was raised whether NC was capable of stabilizing lysosomal membranes by ways other than direct perfusion improvement. Experiments were performed on adult white male rats. It was shown that addition of NC ( $1.25 \cdot 10^{-5}$  and  $2.5 \cdot 10^{-5}$  %) to rat myocardial tissue homogenates increased the activity of acid phosphatase during a 2.5 hr incubation at 37°C; the percent ratio of free and total activity of acid phosphatase was lowered. The higher concentration of NC lowered free activity of cathepsin D after 30 min and the free activity of acid phosphatase after 2.5 hrs of incubation at 37°C. Figures 2; references 5 (Russian).  
[263-7813]

UDC 615.22.03:616.132.2-089

ANTIFIBRILLATORY ACTIVITY OF SOME ANTIARRHYTHMIC AGENTS WITH MAXIMUM LIGATION OF CORONARY ARTERY AND ITS REPERFUSION IN CATS

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 3, May-Jun 85  
(manuscript received 26 Mar 84) pp 47-49

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[Abstract] Antifibrillatory properties of antiarrhythmic agents were studied: Lidocaine (Li), Obsidane (Ob), Isoptine (Is), Novocainamide (No), Ethmosine (Et), Cordarone (Co), and Phenicaberane (Ph), using cats anesthetized with nembutal. Ph and Li were the most effective agents diminishing the fibrillation frequency to 20%, followed by Co and No (30% fibrillation). Ob, Is, and Et showed only an insignificant antifibrillatory action. Ph could be used in form of tablets, and therefore it was considered to be superior to Li. These two drugs were recommended for prophylactic use in arrhythmias. References 15: 11 Russian, 4 Western.  
[263-7813]

EFFECT OF UNITHIOL ON MYOCARDIAL AND ADRENAL ULTRASTRUCTURE IN ENDOTOXIN SHOCK

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 3, May-Jun 85  
(manuscript received 28 Feb 84) pp 49-52

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[Abstract] Activation of the sympathetic-adrenaline system accompanied by hypercatecholaminemia, which leads to ultrastructural damage of the myocardium, is an important issue in pathogenesis of endotoxin shock. Unithiol prevents the damaging action of adrenaline and noradrenaline by binding catecholamines and preventing them from reacting with sulphhydryl groups of the  $\beta$ -receptors. Unithiol action on ultrastructural changes in myocardium and adrenals during endotoxin shock was studied on dogs. The experiments showed that unithiol facilitated deposition of catecholamines in chromaffinic cells, blocked their secretion into the blood stream, and prevented damage to adrenal cortex. Also, it prevented damage to intracellular organelles of cardiomyocytes; slight damage of the contractile apparatus and histohematic barriers could not be prevented. This drug was recommended for treatment of septic conditions. Figures 1; references 14: 11 Russian, 3 Western.  
[263-7813]

EFFECT OF BROMOCRYPTIN ON ALCOHOL CONSUMPTION AND CATECHOLAMINE LEVEL IN RAT BRAINS UNDER CONDITIONS OF CHRONIC ALCOHOLISM

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 3, May-Jun 85  
(manuscript received 7 Jun 84) pp 88-91

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[Abstract] Using male rat models of chronic alcoholism, the action of bromocryptin--a stimulator of dopamine receptors--was studied. It was shown that bromocryptin normalizes dopamine metabolism and lowers alcohol consumption under experimental conditions. The use of bromocryptin prevents dopamine level from increasing in rat hypothalamus during alcohol withdrawal. In most of the observations, bromocryptin paralleled the action of apomorphine which already is used in clinical practice for this purpose. References 14: 6 Russian, 8 Western.  
[263-7813]



## INVESTIGATION OF PARMIDIN ANTAGONISM TO KININ EFFECTS

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 6, Nov-Dec 85  
(manuscript received 24 Apr 84) pp 37-41

SHVARTS, G.Ya., FAYERMARK, I.F. and SYUBAYEV, R.D., Laboratory of Pharmacology (Chief: Academician of USSR Academy of Medical Sciences M.D. Mashkovskiy) All-Union Scientific Research Institute of Chemical Pharmacology imeni S. Ordzhonikidze, Moscow

[Abstract] Parmidin (pyridinolcarbamate, PD) is an antagonist of bradykinin (BK) responsible for lowering or totally blocking its pharmacological effects. The character of this antagonism towards spasmogenic and microcirculatory effects of BK, lysyl-BK (Lys-BK) and methionyl-lysyl-BK (Met-Lys-BK) was investigated on isolated tissue slices of experimental animals: guinea pig ileum, rat uterine cornua, cat jejunum, and rabbit aorta strips. Starting with a concentration of  $10^{-9}$ - $5 \cdot 10^{-9}$  g/ml, PD decreased spasmogenic effects of all three BK's studied. This action was dose-related, specific, and reversible. PD showed no action on myotropic effects of angiotensin II, acetylcholine, histamine, serotonin, prostaglandin  $F_2$ , and  $BaCl_2$ . It was concluded that PD competed effectively with BK for the receptors because of similar bonding energy. The other molecules studied, Lys-BK and Met-Lys-BK, also bind through BK, but due to various conformational aspects they showed either competing or noncompeting effect. Figures 2; references 9: 6 Russian, 3 Western.

[266-7813]

## PULMONARY CIRCULATION CHANGES CAUSED BY ARMINE

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 6, Nov-Dec 85  
(manuscript received 13 Apr 84) pp 41-43

SIZOVA, K.V., SHESTOVA, G.V. and PREDTECHENSKIY, M.B., Institute of Toxicology, USSR Ministry of Health, Leningrad

[Abstract] The goal of this work was to study the dynamics of changes taking place in pulmonary blood circulation as affected by anticholinesterase agent armine and to look for possible connection between these changes and some indices of the respiratory and cardiovascular system. A dual phase reaction of pulmonary vessels was observed in response to IV administration of a  $LD_{50}$  dose of armine (0.2 mg/kg): a short-term increase in pulmonary blood flow ( $10.3 \pm 2.4\%$ ) with increased femoral artery pressure ( $14.9 \pm 3.1\%$ ), followed by a two-fold drop in pulmonary blood flow and a slow decrease in arterial pressure. This reduction was accompanied by development of bronchial constriction, brachycardia, and arterial hypoxemia. During the initial

intoxication period, the pulmonary blood flow drop correlated with the development of bronchial constrictions; as the pathological process intensified, the decrease in blood flow was caused by bradycardia; the relationship to bronchial constriction remained unchanged. Figures 1; references 10: 6 Russian, 4 Western.  
[266-7813]

UDC 615.285.7:547.241].099:616.8

#### DELAYED NEUROTOXIC EFFECT OF NEW FUNGICIDE APHOS

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 48, No 6, Nov-Dec 85  
(manuscript received 14 Jan 85) pp 80-83

TKACHENKO, I.I., KAGAN, Yu.S., KOKSHAREVA, N.V. and BADAYEVA, L.N.,  
Division of Experimental Toxicology and Pathology of Chemical Etiology  
(Director: Prof Yu.S. Kagan) of the All-Union Scientific Research Institute  
of Hygiene and Toxicology of Pesticides, Polymers and Plastics, USSR Ministry  
of Health, Kiev

[Abstract] Aphos (O,O-diphenyl-1-acetoxy-2,2,2-trichloroethylphosphonate) has a structure closely resembling that of chlorophos. For this reason, it was evaluated for possible delayed neurotoxic effect. The experiments were done on white Russian hens, injecting them with a 1-10% aqueous emulsion corresponding to 10, 25, 50, 100, 200, and 300 mg/kg dose. Aphos proved to be a weakly toxic agent, its LD<sub>50</sub> being 3 g/kg body weight, single oral administration. Overall, it exhibited neuromuscular activity in a wide range of doses (25 to 3,000 mg/kg) accompanied by ataxia and paralysis, as well as functional-morphological changes in neurons and muscular system. Minimal neurotoxic dose appeared to be 25 mg/kg. This neurotoxic action was observed with chemically pure aphos, hence it could not be due to any impurities. Figures 1; references 7: 4 Russian, 3 Western.  
[266-7813]

UDC 616-006-03:615.277.3 Furizil

#### ANTINEOPLASTIC ACTIVITY AND PHARMACOLOGIC CHARACTERISTICS OF FURIZIL

Leningrad VOPROSY ONKOLOGII in Russian Vol 31, No 5, May 85 (manuscript received 17 Aug 84) pp 52-54

STUKOV, A.N., KRAYZ, B.O., ALEKSANDROV, V.A., IVIN, B.A. and FILOV, V.A.,  
Order of the Red Banner of Labor Scientific Research Institute of Oncology  
named Professor N.N. Petrov, USSR Ministry of Health, Leningrad

[Abstract] Experimental therapeutic trials were conducted with furizil (2-(2-furyl)-5-hydroxymethyl-5-(2,4-diethylimino-1,3,5-triazin-6-yl)amino-1,3-dioxane) to determine its scope of action against tumors and toxicity. Daily

i.p. administration of 2.5 mg/kg of furizil to mice for 8 days resulted in 100% growth inhibition of Ehrlich's ascitic carcinoma, and of 76% inhibition of Ehrlich's solid tumor. In addition, 100% growth inhibition was obtained in the case of Walker's carcinosarcoma in rats on 1.5 mg/kg/day furizil i.p. for 12 days, as well as 86% inhibition of ascitic ovarian tumor and 84% inhibition of sarcoma-45. Employment of various parenteral routes of administration yielded LD<sub>50</sub> values of ca. 6 mg/kg for rats and 15 mg/kg for mice. Furizil toxicity was particularly selective for the hemopoietic, gastrointestinal, and reproductive tissues, but the changes were reversible within 1-2 weeks after termination of furizil administration.

References 5 (Russian).

[215-12172]

## WORK ON INTRODUCTION OF NEW ANTIBIOTICS

Moscow MEDITSINSKAYA GAZETA in Russian 20 Dec 85 p 3

NAVASHIN, S., director of the All-Union Scientific Research Institute of Antibiotics, chairman of the scientific council on the "Antibiotics" problem, USSR State Committee for Science and Technology and Presidium of the USSR Academy of Sciences, Academician of the USSR Academy of Medical Sciences

[Abstract] The author assesses progress in organizing large-scale production and introduction of new types of antibiotics, particularly semisynthetic penicillins and drugs of the cephalosporin group.

Organizations taking part in the introduction of semisynthetic penicillins reportedly include the All-Union Scientific Research Institute of Antibiotics (the chief industry institute, which is under the scientific-methodological direction of the USSR Academy of Sciences), Moscow State University, the Tallin Polytechnical Institute, the Riga and Saransk medical preparations plants, and the Moscow Medical Preparations Production Association imeni Karpov.

The author relates that the antibiotics institute has developed and tested methods for producing the major drugs of the cephalosporin group of antibiotics. An affiliate of the institute is located at the Penza Medical Preparations Plant. This affiliate was created specially for work on cephalosporin antibiotics. The introduction of these antibiotics is said to be lagging, on the whole, due to a lack of experimental production facilities. The author calls for steps to improve planning and incentives in the introduction of new antibiotics, and for mastering genetic-engineering methods for the creation of new antibiotic-producing strains of microorganisms.

FTD/SNAP  
/13046  
CSO: 1840/297

## NEW DRUGS FOR TREATING DEFECTS OF IMMUNE SYSTEM

Moscow MEDITSINSKAYA GAZETA in Russian 20 Dec 85 p 4

MANN, A., correspondent

[Abstract] The article reports on results of research on the thymus gland's functions in the immune system, and on new drugs for correcting defects of this system which have been developed as a result of these studies.

It is recalled that serious study of thymus hormones or mediators began in the early 1970's under the direction of Yuriy Mikhaylovich Lopukhin, member of the USSR Academy of Medical Sciences (AMN SSSR), and academician R.V. Petrov at Moscow Medical Institute No 2 imeni Pirogov. It was discovered that lymphocytes pass through several phases of biochemical transformations in the thymus, and that their immunocompetence is heightened as a result. Studies of this process were subsequently done under the direction of Candidate of Medical Sciences V.Ya. Arion in the laboratory of molecular immunology at the Scientific Research Institute of Physical-Chemical Medicine of the RSFSR Ministry of Health (Minzdrav). It was found that the immunocompetence of lymphocytes is heightened through the action of specialized peptide mediators. A drug called "taktivin" was developed on the basis of these substances, which were isolated from the thymus glands of animals. This drug is said to be capable of normalizing the functioning of the T-system of immunity and thereby producing indirect effects on the B-system as well. Taktivin has been patented in the United States and Great Britain.

Lopukhin, who is currently director of AMN SSSR's Scientific Research Institute of Physical-Chemical Medicine, is quoted in regard to the properties of another unique drug called "baktivin." It was developed recently by Petrov and A.A. Mikhaylova at USSR Minzdrav's Institute of Immunology, with the participation of Lopukhin and his colleagues. Baktivin is said to act directly on the B-immune system, increasing the production of antibodies sharply. It has been used in combination with taktivin to treat very severe cases of immunoparalysis. Lopukhin reported that clinical tests of both drugs are now in progress. A shop which will produce experimental lots of taktivin has been built at an enterprise of USSR Minzdrav in Moscow Oblast.

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1840/298



## PHYSIOLOGY

### COMPLEX FOR STUDYING VIBRATION EFFECTS ON HUMAN BODY

Moscow VECHERNYAYA MOSKVA in Russian 19 Dec 85 p 2

[Text] Associates of the USSR Academy of Sciences' Institute of Machine Science imeni Blagonravov have developed a multipurpose information-and-measuring complex. It is intended for studying effects of vibration on the human body. Studies made with the aid of this complex are making it possible to develop effective means of protecting people against the vibration effects of machines and to make working conditions easier in many branches of the economy.

(A photograph shows senior project engineer Ye. Puchkov; A. Odulo, head of a group; and N. Ivashkina, a junior science associate, recording dynamic characteristics of the human body with the aid of the complex.)

FTD/ SNAP

13046

CSO: 1840/297

UDC 612.82+681.142.352

DEVICE FOR DISCRETE INFORMATION INPUT INTO MICROCOMPUTER 'ELEKTRONIKA DZ-28'

Moscow BIOLOGICHESKIYE NAUKI in Russian No 6, Jun 85 (manuscript received 20 Jul 84) pp 108-111

MYASNIKOV, A.A.

[Abstract] The current state of physiological experiments makes it possible to capture very fine nuances of the behavior of excited neurons. It is imperative to have a computer on-line to perform effectively such experiments. Of the available hardware, some are not easily accessible at laboratory level; some are simply too expensive. A simple device is described which could be utilized to solve such problems by linking electrophysiological equipment with a microcomputer "Elektronika DZ-28" and thus making it possible to enter information on impulse activity of neurons directly from the experimental setup. Figures 3; references 4 (Russian).  
[1016-7813]

UDC 616.127-005.8-06:616.127-C08.3-084:[612.014.49-06:613.863]-092.9

PREVENTION OF DISORDERS IN HEART CONTRACTILITY DURING MYOCARDIAL INFARCTIONS BY MEANS OF PRELIMINARY ADAPTATION TO SHORT STRESS EXPOSURE

Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 3, May-Jun 85 (manuscript received 28 Mar 83) pp 9-13

MEYERSON, F.Z., ZAYATS, V.I. and BELKINA, L.M., Institute of General Pathology and Pathological Physiology, USSR Academy of Medical Sciences, Moscow

[Abstract] Myocardial infarction is accompanied by an emotional-pain stress which affects, among other things, contractile functions of nonischemic segments of the heart; it was of interest to discover to what extent such disorders could be prevented by preliminary adaptation to short-lasting stress (immobilization). Experiments were performed on white male Wistar rats. It was shown that short immobilization produced positive local inotropic effects on the contractile function of left ventricle. This effect of preliminary adaptation was evident even during maximum physical load on the heart

(clamping of the aorta). Previously-adapted animals showed higher intensity of the functioning of various structures, developing pressure, and the contraction rate. This protective effect was due to the fact that adaptation prevented the stress-induced contractility disorders of the nonischemic parts of the heart during infarction. Figures 1; references 8: 7 Russian, 1 Western.  
[1033-7813]

#### COMPUTERIZED ACTIVITY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Dec 85 p 4

[Article by DMITRUK, M., "Order for Inspiration"]

[Abstract] An anecdotal case is cited by I.P. Ratov, Director of a Division of All-Union Scientific Research Institute of Physical Education: The director of Bombay Center, Djasadewu Johendru, visited the laboratory of Dr Ratov, who demonstrated a "mind reading" machine. Sensors were attached to his hands and connected to a vectorgraph. Without any movement or stress, Dr Ratov was able to move an electronic point on a display screen, drawing geometric figures and even letters. What was happening was that the machine amplified electric potential changes in the muscles and these signals controlled the electronic dot. This phenomenon harks back to the findings of I.M. Sechenov that there is a connection between brain functions and muscular performance. The work at this Institute concentrates on computer applications to "mind reading" and to possible applications of this technology to any field: training of professional athletes, improvement in work performance, and even in creative work. Various brain signals could be recorded while experiencing a range of activities and emotions. Eventually, with invention of supermicrocomputers, the process could be reversed and programmed to assist an individual in reaching his maximal performance levels by stimulating subconscious brain processes.  
[260-7813]

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TUBERCULOSIS AMONG ADOLESCENTS AND TASKS FOR IMPROVING ITS EARLY DETECTION

Moscow PROBLEMY TUBERKULEZA in Russian No 11, Nov 85 (manuscript received 5 Apr 85) pp 4-7

FIRSCVA, V.A., GRIGORYEVA, Z.P., YATSKOVA, T.V., ORLOVA, L.S., ULYANOVA, V.M., VORONKO, V.V., BOLOTNIKOVA, V.A., IMANBEKOVA, K.B., ALEKSANDROVA, T.M., TSVETKOVA, A.V., IVANOVA, A.P. and POSEVKINA, T.I., Central Scientific Research Institute of Tuberculosis USSR Ministry of Health, Moscow

[Abstract] In spite of the existing health screening programs, during recent years many adolescents were identified with widely-spread tuberculosis. In an attempt to improve early detection, a cooperative study was undertaken with participation of the Central Scientific Research Institute of Tuberculosis, USSR Ministry of Health, the Moldavian, Yakutsk, and Kazakh Scientific Research Institutes of Tuberculosis, Departments of Tuberculosis at Tadzhik and Stavropol Medical Institutes and a number of regional anti-tuberculosis dispensaries. It was observed that girls and rural residents had higher levels of the disease, and their disease was more dispersed. Pulmonary tuberculosis was the leading site with predominance of the infiltrative form. Fluorography was the main detection method, but it was not applied systematically. It was concluded that teen-age girls, especially those living in rural areas, should be undergoing annual screening. Various drugs used to treat TB were found to be effective, but therapy was usually prolonged, leaving residual lesions. Therefore, prophylactic screening is advocated. References 8 (Russian).  
[267-7813]

EXPERIENCE IN POPULATION SCREENING BY OPHTHALMOLOGICAL SERVICE IN MANGYSHLAK  
TERRITORIAL-PRODUCTION COMPLEX

Moscow VESTNIK OFTALMOLOGII in Russian Vol 101, No 6, Nov-Dec 85 pp 3-4

ULDANOV, G.A., professor, MUSTAFINA, Zh.G., senior scientific worker,  
UTEGAZIYEV, Sh.N. (deceased), TELEUOVA, T.S., MAMBETOV, Ye.K., GOLDMAN, Z.M.,  
YACHMENEV, V.M. and RAKHMETOVA, F.A., Kazakh Scientific Research Institute of  
Eye Diseases (Director: Distinguished Scientist of Kazakh SSR, prof G.A.  
Uldanov), Alma-Ata

[Abstract] Extreme climatic conditions, low population density, inadequate staffing by ophthalmologists, and insufficient technical-material facilities resulted in a need to provide special assistance to the population of Mangyshlak Oblast in the area of eye care. Considerable preparatory work was needed prior to initiation of the population-based screening [dispensarization]: establishment of an examination network, education of the population at large and the medical and paramedical personnel, expansion of available screening personnel through the use of medical students, etc. The screening covered over 25,000 individuals; 9,000 of them had some problem with their vision: one-third had eyelid problems, conjunctivitis; refractory problems surfaced in 50% of the examined ones and cataracts in 6.5%. Over 8,000 glasses prescriptions were filled out, 950 of them for astigmatism. Surgical treatment was scheduled for the autumn and spring months. Overall cooperation of many professional, administration, and socio-political segments was needed for this project to succeed.  
[261-7813]

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UDC 615.849.1.065.084

ALL-UNION SCHOOL 'PROPHYLAXIS AND TREATMENT OF RADIATION INJURY'

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian No 7, Jul 85 pp 93-94

GUSEVA, L.I. and GUNKO, R.I., Obninsk

[Abstract] The All-Union School mentioned in the title was held at the Exhibition of Achievements of the National Economy, 24-28 Oct 1984. The school was organized by the USSR Ministry of Health, Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, and the "Atomic Energy" Pavillion. Some 96 specialist physicians representing 55 cities from 11 Union Republics took part in the school, hearing and discussing 19 reports on the following problems: the status and means of improving radiation therapy; contemporary radiobiological aspects of planning and conduct of radiation therapy; neutron therapy of malignant tumors and injury to healthy tissues; classification, diagnosis, and treatment of delayed radiation injury to various organs. Attendees visited the Scientific Research Institute of Medical Radiobiology, where they were familiarized with methods of conservative and surgical treatment of local radiation injury and planning and conduct of radiation therapy. The following recommendations were adopted: broader use of modern radiation therapy methods, provision of information to interested specialists on the results of the work of the school, and introduction of the classification "local radiation injury" to the statistical accounting and reporting documentation for cancer patients. [1012-6508]

UDC 577.123

UV- AND X-RAY-INDUCED DNA DAMAGE: YIELD EFFECTS OF SEROTONIN

Moscow BIOKHIMIYA in Russian Vol 50, No 8, Aug 85 (manuscript received 15 Jan 85) pp 1374-1376

IVANOVA, E.V. and FRAYKIN, G.Ya., Biology Faculty, Moscow State University imeni M.V. Lomonosov

[Abstract] An aqueous solution consisting of DNA isolated from E. coli was incubated with serotonin and subsequently irradiated either with UV light

(254 nm,  $3 \text{ W/m}^2$ ) or X-rays (40 Gy/min) to study the effects of serotonin on damage yield. Binding of serotonin to the DNA and its intercalation between bases led to a decrease in thymine dimer formation as a result of UV irradiation. The mechanism responsible for the protective effects of serotonin could either consist of structural changes in the DNA which made dimerization less likely, or be due to transfer of the energy of excitation from the DNA bases to serotonin. In the latter, the primary singlet and triplet levels of excitation are lower than those of the corresponding levels of the bases. Finally, serotonin had no effect on X-ray-induced disruption of N-glycosidic bonds in the thymine residues. Figures 3; references 14: 7 Russian, 7 Western.  
[280-12172]

UDC 577.391:547.963.3

#### RADIOPROTECTIVE ACTION OF CATECHOLAMINES ON CHINESE HAMSTER FIBROBLAST CULTURE

Moscow BIOLOGICHESKIYE NAUKI in Russian No 5, May 85 (manuscript received 8 Jan 85) pp 38-41

CHIRKOV, Yu.Yu., MALATSIDZE, M.A. and SOBOLEV, A.S., Department of Biophysics, Moscow State University imeni M.V. Lomonosov

[Abstract] Experimental results obtained in a comparative study of radioprotective ability of adrenaline, noradrenaline, and isoproterenol on Chinese hamster fibroblast culture are reported. All of these agents were found to be effective radioprotectors. Their activity paralleled their reaction with  $\beta$ -adrenoreceptor: isoproterenol>adrenaline>noradrenaline. Specific  $\beta$ -antagonist propranolol blocked the radioprotective activity of catecholamines. The data indicated that a  $\beta$ -adrenergic mechanism is involved in this radioprotective action. Figures 1; references 18: 9 Russian (1 by Western author), 9 Western.  
[1017-7813]

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UDC 543.51

AMINOACID SEQUENCE OF SOME TRYPTIC PROTEIN PEPTIDES FROM TICK-BORNE  
ENCEPHALITIS VIRUS ENVELOPE

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 12, Dec 85 (manuscript  
received 3 Sep 85) pp 1677-1680

BARAM, G.I., GRACHEV, M.A., NAZIMOV, I.V.,\* PLETNEV, A.G., PRESSMAN, Ye.K.,  
RUBIN, S.G.,\*\* SALNIKOV, Ya.A.,\*\* SEMASHKO, I.V.,\* CHUMAKOV, M.I.,\*\*  
SHEMYAKIN, V.V.\* and YAMSHCHIKOV, V.F., Novosibirsk Institute of Bioorganic  
Chemistry, Siberian Department of USSR Academy of Sciences; \*Institute of  
Bioorganic Chemistry imeni M.M. Shemyakin, USSR Academy of Sciences, Moscow;  
\*\*Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of  
Medical Sciences, Moscow

[Abstract] Separation of trypsinized hydrosylate of protein E, by a micro-  
column reverse-phase, high performance liquid chromatography, is described.  
Aminoacid sequences of four isolated trypsinized peptides were reported.  
These sequences correspond totally to nucleotide sequences found in viral  
protein E gene. Aminoacid sequences of these peptides were found to be:  
Ser-Val-Leu-Ile-Pro-Ser-His-Ala-Gln-Gly-Asp-Leu-Thr-Gly-Arg; Thr-Glu-Gly-  
Ala-Gln-Asn-Trp-Asn-Glu-Arg; Trp-Leu-Glu-Gly-Asp-Ser-Leu-Arg; and Leu-Val-  
Glu-Phe-Gly-Ala-Pro-His-Ala-Val-Lys. For the first time, microcolumn liquid  
chromatography "Ob-4" was used in isolating peptides with excellent results.  
Figures 1; references 10: 3 Russian, 7 Western.  
[268-7813]

UDC 577.113.5

N-TERMINAL AMINOACID SEQUENCES OF STRUCTURAL PROTEINS OF TICK-BORNE  
ENCEPHALITIS VIRUS

Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 11, No 12, Dec 85 (manuscript  
received 13 Aug 85) pp 1681-1684

PLETNEV, A.G. and YAMSHCHIKOV, V.F., Novosibirsk Institute of Bioorganic  
Chemistry, Siberian Department of USSR Academy of Sciences, Novosibirsk

[Abstract] The goal of this study was to determine nucleotide sequence of  
tick encephalitis virus (TEV) genome fragment coding structural proteins of

this virus. From primary structures of E and C protein genes, N-terminal aminoacid sequences of these proteins were isolated showing that the genes of structural proteins were located in a single block on the TEV RNA. DNA copies of TEV genome were cloned in *E. coli* cells by the connector method along *Pst*I-site of pBR 322 plasmid. Strong homology (82%) of the N-terminal nucleocapsid proteins C from two TEV strains was observed; with other flaviviruses YF, SLE, and DEN, the homology was in the range of 12-18% only. It was concluded that C protein codes at the beginning of a block of structural genes and its synthesis could be initiated from a methionine radical. Figures 2; references 7: 1 Russian, 6 Western (2 by Russian authors). [268-7813]

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## CONFERENCES

UDC 615.37+615.276.4]:061.3(100)"1984"

### MODERN METHODS OF IMMUNOTHERAPY (RESULTS OF SCIENTIFIC CONFERENCE WITH INTERNATIONAL PARTICIPATION)

Moscow IMMUNOLOGIYA in Russian No 5, Sep-Oct 85 pp 90-92

GARIB, F.Yu. and KOLOBOV, A.V.

[Abstract] An international scientific conference entitled "Modern Methods of Immunotherapy" was held in Tashkent 24-26 Oct 1984. Some 500 persons from 10 Union Republics took part in the conference, hearing more than 70 reports over 3 days in 2 plenary and 3 sectional sessions. The conference was opened by A.M. Khudaybergenov, Minister of Health of the Uzbek SSR. The Chairman of the All-Union Scientific Society of Immunologists, Director of the Institute of Immunology, USSR Ministry of Health, Academician of the USSR Academy of Sciences, R.V. Petrov spoke at the opening session, and Doctor of Medical Sciences S.I. Kolesnikov of Novosibirsk presented a report entitled "Immunology in the Struggle for Prevention of Nuclear War." R.M. Khaitov discussed "Correction of Immunogenesis by Artificial Immunogens," defining the new immunogenetic principle of creation of artificial T-independent highly immunogenic preparations by attachment of haptenes or antigen determinants to high molecular weight polyon immunostimulators. A report by R.V. Petrov and others discussed synthesis of artificial vaccinating complexes effectively protecting humans from a number of bacterial and viral infections by induction of a B-cell response independent of the T-cell and Ir-gen control of immunogenesis.  
[231-6508]

### SOVIET-FINLAND SYMPOSIUM ON DEVELOPMENT BIOLOGY (TBILISI, 31 OCTOBER-4 NOVEMBER 1984)

Moscow ONTOGENEZ in Russian Vol 16, No 3, May-Jun 85 pp 317-318

MIKHAYLOV, A.T., Scientist-Secretary of Symposium

[Abstract] The topic of this Symposium was "Membranes and Cellular Interactions in Development." One of the goals was to renew old contacts between the Soviet and Finnish scientists. Therefore, many scientists from a number of universities participated in this Symposium. Three areas were



covered: 1) intercellular reactions and differentiation, 2) gene expression in development (including aspects of biotechnology and genetic engineering), and 3) cellular and nuclear membranes and their role in differentiation and growth. The papers presented at the symposium were published in ONTOGENEZ, No 4, 1984.  
[1036-7813]

UDC 061.3:582.282.23

#### SIXTH INTERNATIONAL (GENERAL) SYMPOSIUM ON YEASTS

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 19, No 3, May-Jun 85  
(manuscript received 6 Sep 84) pp 277-279

YELINOV, N.P., Leningrad Chemical-Pharmaceutical Institute

[Abstract] The symposium was held 9-13 Jul 84 in Montpellier (France). Five Soviet scientists attended: M.Y. Beburov, N.B. Gradova (leader of the delegation), N.P. Yelinov, I.P. Kuranova, and V.S. Orlova. Twelve scientific topics were covered: nutrition and growth, oxidation and fermentation, biochemistry of subcellular structures, biosynthesis and regulation, enzymology and mechanism of action of enzymes, histochemistry and cytology, genetics, ecology, pathology and immunology, industrial and agricultural yeasts, membranes and transport and taxonomy. A meeting of the "Yeast Commission" MAMO was held 9 Jul 84 addressing cooperation with the mycologic division of UNESCO, publication of "Yeast News," planning for the next general symposium to be held in Italy in 1988, membership, etc. Professor P. Galsi and professor Zh.M. Bastid were elected chairman and secretary, respectively, of the Yeast Commission for the next 4 years.  
[1026-7813]

/13046

MISCELLANEOUS

DIVERS IN PRESSURE CHAMBER ON BOARD DIVING VESSEL

Moscow MEDITSINSKAYA GAZETA in Russian 18 Dec 85 p 4

[Text] In an interesting experiment performed in the Barents Sea, specialists of the diving vessel "Sprut" descended to a record depth of 300 meters and carried out all planned work successfully. This vessel's divers worked in support of geologists who are doing exploratory drilling in the coastal zone of Arctic seas.

Hurricane-force winds, movements of ice masses and other natural factors can cause various breakdowns of drilling mechanisms, and such breakdowns have to be eliminated at various depths. Training dives must be made constantly under careful medical observation if work is to be done in such conditions. Divers of the vessel spent several days in a pressure chamber in maximum-load conditions before making their record dive.

(A photograph shows divers under the observation of physician B. Vlasov in a pressure chamber of the "Sprut," following the record dive.)

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CSO: 1840/297

## HEATED DIVING SUIT FOR OFFSHORE OIL RIG WORKERS

Moscow NEDELYA in Russian No 1, 30 Dec 85-5 Jan 86 p 5

[Article by Anatolyev, Yu. (Kharkov)]

[Text] Intensive development of gas and oil fields of the continental shelf has necessitated the development of effective underwater gear which is capable of ensuring the life support and safety of divers at comparatively great depths. Under the direction of G.N. Kucherenko, V.G. Komarenko and V.A. Skrebitskiy, specialists of the Ukrainian affiliate of the All-Union Scientific Research Institute of the Offshore Petroleum and Gas Industry have developed a diving complex which is the first of its kind in Soviet practice. It has reliable life-support systems: breathing apparatus, communications equipment, and heat generating unit. The suit itself is original, and it is even comfortable for divers. Some of its design solutions are protected by certificates of invention. The new diving suit's technical parameters match those of the best foreign models. Tests of the suit are now in progress.

FTD/SNAP

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CSO: 1840/298

## PHYSICIANS TRAINED IN MEDICAL SUPPORT OF DEEP DIVING

Moscow MEDITSINSKAYA GAZETA in Russian 3 Jan 86 p 4

[Article by Aleksandrov, A. (Leningrad)]

[Excerpt] A man clad in underwater gear descended into a training pool. His assignment was to find a certain object on the bottom and to join flanges of pipes. This is an ordinary exercise for students of divers' schools. But it was being performed by a physician studying at the Leningrad State Institute for the Advanced Training of Physicians (GIDUV). Why does he need such training?

"Physicians will not take part directly in deep-diving work, of course, but they must have an idea of the conditions and character of the work that persons under their care will be doing," replied docent Boris Aleksandrovich Nessirio, head of the institute's training program for medical personnel serving divers.

Such divers must live and work under high pressure for rather prolonged periods of time. At offshore drilling rigs, such a period lasts two weeks, as a rule. Divers work in the water for four to five hours a day. They descend to deep levels and resurface in a diving bell. On the surface, they go from the bell into a pressure chamber.

Physicians are not with them constantly. Instruments enable the physician to monitor the health of divers under his care, through the wall of the pressure chamber. He can obtain electrocardiograms, electroencephalograms, blood pressure readings and other data he needs, and monitor the composition of the chamber's gas mixture. Although the diving profession is only for people in perfect health, cases of sudden illness and trauma cannot be precluded. Emergency medical intervention may be required at any moment. As is known, a person cannot be taken 'out from under pressure' quickly. This means that the physician himself must be constantly ready to 'dive'--to enter the pressure chamber through a lock and render assistance up to the point of conducting surgical operations.

B.A. Nessirio himself has worked with divers for many years.

"One must feel at ease in a pressure chamber," he related. "One must know how to give treatment as if in one's own office. Specific diseases, external

otitides, dermatitides, other ailments and traumas occur in underwater work, unfortunately. We therefore are devoting paramount attention to our students' special training. Training exercises are now being conducted using facilities of the first expeditionary detachment for underwater technical work of the Moscow Administration for Underwater Technical and Construction Work of the RSFSR Ministry of the River Fleet, in a pool with a pressure chamber. The construction of a training complex of our own has been delayed because of errors in the plans. We would like associates of the Leningrad Scientific Research Institute of Construction Designing to expedite the correcting of these plans."

The Leningrad GIDUV is the only educational institution in the country that offers physicians such specialized training at the present time. About 60 students, including more than 40 deep-diving personnel, have been trained in two years. Graduates of the program are working in the Far East and on the Caspian and Black Seas. The program was transformed into an independent chair of instruction at the end of December. Its associates and students propose to add the specialty 'diving' to the list of medical specialties.

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REVIEW OF PATENT LITERATURE, 1977-1980, DEDICATED TO IMMUNOLOGIC PROCESS AND NONSPECIFIC RESISTANCE STIMULATORS

Moscow IMMUNOLOGIYA in Russian No 3, May-Jun 85 (manuscript received 12 Feb 84) pp 90-91

KUDRYAVTSEVA, N.G., DZHEKSENBAEV, O.Sh., PANINA, G.A. and RYZHKOVA, N.I., Central Scientific Research Institute of Vaccines and Sera imeni I.I. Mechnikov, USSR Public Health Ministry, Moscow

[Abstract] A review is presented of the patent literature for 1977-1980 in the area of stimulus of immunologic processes and nonspecific resistance, covering 55 patents and author certificates in 6 countries: France--24, USA--13, USSR--9, West Germany--5, Japan--3, and Great Britain--1. Eight of the 24 French patents were submitted by employees of the "Anvar" Company. The patents can be subdivided into 6 groups: (1) Various bacteria and their components; (2) Polysaccharides (endotoxins); (3) Synthetic glycopeptides; (4) Polyanions, polycations, aliphatic compounds, and nuclei acids; (5) Various organic compounds; and (6) Emulsion preparations. Soviet authors developed a soluble immunoadjuvant, obtained by fractionation of streptomycin sulfate or dehydrostreptomycin sulfate with disintegrated whooping cough bacteria. No basically new works have appeared in the years covered by the study. Development of new preparations is following in paths already outlined in earlier years. The only new group of immunostimulants is the glycolipids, including synthetic ones. References 44: 9 Russian, 35 Western. [228-6508]

TIME-CONSUMING EXPLOITATION OF THERAPEUTIC DISCOVERIES

Moscow SELSKAYA ZHIZN in Russian 13 Dec 85 p 2

GOVYRIN, V., academician, ZHEBROVSKIY, L., professor, and KHOVANSKIKH, A., professor, Leningrad

[Abstract] An appeal is made to develop organizational forms for integrating basic science with industrial applications so as to bring into wide use some of the more promising discoveries made on the laboratory level. Examples of such developments are given; however, the time lost in the technology transfer

is pointed out. New, safe, and highly effective insecticides were developed by the Institute of Evolutionary Physiology and Biochemistry imeni I.M. Sechenov; Institute of Heteroorganic Compounds, USSR Academy of Sciences; and All-Union Scientific Research Institute of Plant Protection, All-Union Academy of Agricultural Sciences imeni Lenin. A hybrid beluga and sturgeon called beloship was developed at the Institute of Physiology imeni I.P. Pavlov, USSR Academy of Sciences and Institute of Physiology, AzSSR Academy of Sciences. This hybrid grows very rapidly, and it should be in commercial production in the near future. Scientists at the Institute of Cytology, USSR Academy of Sciences Institute of Experimental Medicine, USSR Academy of Medical Sciences and All-Union Scientific Research Institute of Breeding and Genetics of Agricultural Animals are developing highly productive, disease-resistant animals by genetic engineering methods. Using iodinol as an example of an effective veterinary drug and a conserving agent in nutritional industry, the authors point out that the transition from laboratory to production took a much too long a time.  
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